



Final Accident Investigation Factual Report-8/26/04

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Waterfall Fire Entrapment Carson City, Nevada July 14, 2004





The Board of Review for the Waterfall Wildfire Entrapment

Convened August 13, 2004
Carson City, Nevada

A handwritten signature in blue ink, reading "John D. Berry".

Chair --John Berry, Forest Supervisor, Eldorado National Forest

A handwritten signature in blue ink, reading "Pete Anderson".

Pete Anderson, State Forester, Nevada Division of Forestry

A handwritten signature in blue ink, reading "Lou Buckley".

Lou Buckley, Chief, Carson City Fire Department

A handwritten signature in blue ink, reading "Ed Monnig".

Ed Monnig, Deputy Forest Supervisor, Humboldt-Toiyabe National Forest

A handwritten signature in blue ink, reading "Steve Holdsambeck".

Steve Holdsambeck, Wildland Fire Safety Manager, USFS Region 4

Interagency Board of Review
Waterfall Fire Entrapment
Of July 14, 2004

Board of Review Members

Chair – John Berry, Forest Supervisor, Eldorado National Forest
Pete Anderson, State Forester, Nevada Division of Forestry
Lou Buckley, Chief, Carson City Fire Department
Ed Monnig, Deputy Forest Supervisor, Humboldt-Toiyabe National Forest
Steve Holdsambeck, Wildland Fire Safety Manager, USFS Region 4

The Board of Review was convened on August 13, 2004 for the purposes of:

- Hear a report from the Waterfall Fire Burnover Accident Investigation Team – Joe Freeland and Jim Payne.
- Discuss the finding of the Accident Investigation and determine if the findings were acceptable to the Board, and if the findings adequately address the incident.
- Accept, modify or reject the draft recommendations of the accident review team.
- Determine any follow up actions needed and document them.

Review of the Investigation Report

It is the consensus of the Board of Review to accept the findings of the Waterfall Fire Burn-Over Report, as amended.

The Board of Review determined the findings, as amended, adequately address the facts and findings.

It was the conclusion of the Board of Review this was an entrapment and the title of the report should state that this was an entrapment.

The Board of Review summarized the key findings into **three causal factors**.

Leadership Failures:

- Lack of predetermined trigger points for initiating withdrawal of resources from Division B and staging, including communications, and understanding; resulting in untimely disengagement and egress.
- No staging area manager was assigned resulting in no single point of contact for communications and unmanaged congestion.
- Management of “Staging Area 2” was not assumed by Division Group Supervisor B. “Staging Area 2” was essentially a drop point and parking lot for Division B resources and the structure protection group.
- Command and General Staff, as well as Operations overhead in Division B, and the structure protection group recognized the traffic problems but did not implement effective action.

Communications:

- The lack of an assigned staging area manager resulted in the absence of a point of contact for communications to and from “Staging Area 2”.
- Radio frequencies were overloaded prior to and during the turnover.
- Personnel at “Staging Area 2” were not advised of the approaching fire front which left them vulnerable to the turnover.
- Retreating firefighters from the blow up on the southeast end of the fire arrived at the “Staging Area 2” just moments before the fire front, leaving little time to personally communicate the danger and to implement evacuations from the “staging area”.

Congestion on Kings Canyon Road and at “Staging Area 2”:

- Unauthorized and non-essential people and vehicles were allowed to drive up the Kings Canyon Road to “Staging Area 2”, and in some cases further into the fire area.
- The Kings Canyon Road provided the primary access into the fire area, but was narrow and had limited parking room at the trailhead which became “Staging Area 2”.
- In some cases vehicles were oriented in the wrong direction, others without operators and/or without keys in the ignition, making rapid egress difficult.

Follow-up Actions Needed:

1. Develop a **common interagency operating plan** among the Sierra Front fire protection agencies addressing how multi-jurisdictional initial attack and extended attack fires will be managed. This operating plan should address such issues as:

Protection Objectives	Transitions from Type 3 to Type 2 IMT's
Organization, Roles and Responsibilities	Aviation Management
Communications Plan	Fire Investigations
Access Management	Control of Un-assigned Resources &
	Un-assigned Agency Officials
Media Management	Use and Management of Staging Areas
Area Closures	Type 3 Incident Management Assignments
Joint Field Exercises	

Responsibility: The Nevada Division of Forestry, Humboldt-Toiyabe National Forest and Carson City Fire Department will develop this plan and disseminate information to all cooperators (Nevada Fire Board, Sierra Front Wildfire Cooperators, Lake Tahoe Fire Chief's Association, and Agency Administrators).

Due Date: April 1, 2005

2. Conduct **follow-up(s) to the after action review** that was done following the Waterfall Incident. Additional topics have surfaced since the initial review was completed. Key players were present for the first review, but information was not disseminated to the lower levels of the fire organizations. Share those results with local cooperators and use them as lessons learned.

Responsibility: Nevada Division of Forestry will take the lead in organizing a follow-up after action review.

Due Date: October 30, 2004

3. Although the investigation team found no unqualified individuals in the Type 3 command structure, agency administrators need to **review all red carded personnel** and their qualifications. The accident investigation team is to forward information on individuals who were not wearing Personal Protection Equipment (PPE) to the individual's agency administrator for appropriate feedback/action. The accident investigation team is to forward information on individuals responsible for "non-compliance of policy" items in the accident investigation report to the appropriate agency administrator for follow-up action.

Responsibility: Accident investigation team feedback to agency administrators on PPE and "non-compliance of policy" individuals.

Due Date: October 30, 2004

Responsibility: Agency administrators review currency, qualifications, and training; and execute appropriate certification or desertification. Agency administrators execute appropriate follow-up for policy non-compliance with respect to PPE.

Due Date: December 25, 2004.

4. Conduct a **review of historical data** of previous Sierra Front burnover and/or entrapment related incidents. Address issues and follow-up actions that have not been brought to closure. At a minimum the following incidents should be reviewed: Autumn Hills, Senica, and American Flats.

Responsibility: Agency Administrators

Due Date: October 30, 2004

5. There is a continuing need for NWCG to address the organization and **management of complex, rapidly developing incidents**. Current Type 3 individuals and Type 3 organizations cannot be expected to safely and effectively manage incidents such as the Waterfall Incident through even a 24 hour period. Develop recommendations for the management of complex; extended attack, wildland fires prior to the arrival of a Type 1 or Type 2 incident management team.

Responsibility: Great Basin Coordinating Group recommendation to NWCG.

Due Date: January 1, 2005

6. There is a need for immediate short term agreement among the Sierra Wildfire Cooperators to use **single incident commanders in Type 5-3 incidents** and not attempt Unified Command, except at Type 1 and 2 levels of ICS management. Develop and distribute direction among Sierra Front Wildland Fire Cooperators to utilize a single incident commander and assign agency liaison officers as jurisdictional concerns dictate.

Responsibility: Sierra Wildfire Cooperators

Due Date: August 31, 2004

WATERFALL INCIDENT BOARD OF REVIEW NOTES

August 13, 2004

Attendees:

Pete Anderson, State Forester, Nevada Division of Forestry
Lou Buckley, Chief, Carson City Fire Dept.
Steve Holdsambeck, Wildland Fire Safety Manager, USFS Region 4
Jim Payne, USDA-Forest Service, Retired
Joe Freeland, Fire Management Officer, Elko Field Office, Bureau of Land Management
Ed Monnig, Deputy Forest Supervisor, Humboldt-Toiyabe National Forest
Allison Good, Safety, USFS Chief's Office
Bob Ashworth, Fire Management, Nevada Division of Forestry
Mike Dondero, Chief, Fire and Aviation, Humboldt-Toiyabe National Forest
Randy Dregger, Safety Officer, USFS Region 4
Mike Dudley, Director, Fire and Aviation, USFS Region 4
John Berry, Forest Supervisor, Eldorado National Forest
Lee Ann Evans, Fire Business Mgmt Specialist, Humboldt-Toiyabe National Forest

Purpose of the Board of Review:

- Hear report of the accident review board and their findings.
- Discuss findings.
- Accept, modify, or reject adequacy of review.
- Accept, modify, or reject recommendations of the board.
- Determine if follow up actions by the group need to be taken.
- Prepare accident prevention plan.

The board made the decision to include Ed Monnig on the board for this review.

Joe: Presentation of the accident review boards report.

- The Sierra Front Wildfire Cooperators, made the decision to investigate the burnover that took place on the Waterfall Incident, July 14, 2004. There were 21 firefighters and 18 vehicles that were involved. (Of 36 vehicles at or near Staging Area 2, 18 were able to escape the burnover, 11 vehicles were not able to escape and sustained little or no damage, and 7 vehicles were destroyed or severely damaged.)
- The investigative team was a diverse cadre with Inter-agency representation and expertise.
- Was this an accident, an incident with potential or an entrapment? There were several burns but no fatalities.
- Team had to look at participating agency policies and guidelines to determine if they had been followed during initial and extended attack on the incident.
- Were there clear lines of communication?

- Team conducted seventy plus interviews.
- At the request from the Intermountain Regional Office, all names were withheld from the report.
- Arson Investigators provided video and still footage as well as Eng-3 out of Carson City. Local Channel 4 and Channel 8 also provided invaluable footage that aided in the investigation. (An edited version of the clip was viewed by the group today to provide a clear picture of the events that led to the burnover.)
- Radio logs were provided by Minden dispatch.

Jim: Development of findings.

- Brainstorming within the team to come up with possible answers.
 - Initially the team had 53 findings in 10 categories.
- ❖ **Environmental and Fire Behavior:** Very high indices, ERC's above 97%, weather data was properly relayed, potential was there with Haines Index of 5. The blow-up on the north end of the fire caused the south end of the fire to spot and spread northeast and to the burnover at Staging Area 2.
 - ❖ **Multi-Jurisdictional Incident Management:** It was assumed that NDF was the jurisdictional agency at approximately 0300. Unified command was established at IA with an IC from both NDF and CCFD at 0600 Forest Service was added to Unified Command. Each of the three IC's discussed with their Agency Administrators what there plan was for management objectives on the incident. Command and Operations personnel realized the threat of significant downhill fire spread. Trigger points for disengagement and evacuation were not identified.
 - ❖ **Communications:** A communication plan was in place with five radio frequencies which included command, two tactical frequencies, air to ground, and air to air. However, frequencies were overloaded. With this radio traffic congestion, numerous overhead personnel started using their home unit frequencies and cell phones for communication. This resulted in critical information not being relayed to personnel on the fire who had a "need to know" resulting in more confusion on fire status and tactics.
 - ❖ **Firefighter and Public Safety:** All resources were briefed prior to assignment but briefings were inconsistent. Lookouts were posted. All resources interviewed had identified escape routes and safety zones. Many assigned and un-assigned personnel were in the fire area without PPE. Was Staging Area 2 assigned by command or did it just develop? It was formally designated and was originally called the "upper staging area". Uncontrolled access into Staging Area 2 resulted in a multitude of people and vehicles in a very congested area. Many of these people were there in an unofficial capacity from their respective fire protection agencies, adding to the congestion on Kings Canyon Road. This compromised the safety of tactical firefighting personnel and their ability to escape the entrapment in Staging Area 2. From the time the fire spotted to the fire actually

burning through Staging Area 2 was approximately 10 minutes. Command and Operations recognized the potential for a bottleneck in Staging Area 2 but no one took decisive action to remedy the situation. Check in procedures lacked accountability for who was on the fire or who was allowed into the area. The SOF3 temporarily pulled two hand crews off the line in DIV A due to increased fire activity, working up canyon from point of origin, unanchored line and a downhill spot fire. As spotting occurred across the road, one of the three IC's (FS), the Operations Section Chief and the TFLD (one engine) were on site watching it develop. Evacuations of homes and private parties were accomplished using proper procedures and law enforcement personnel. At Staging Area 2 notification to withdraw was done face to face as people were trying to escape the area. Shortly after 1100 two crew members from the Slide Mountain hand crew sustained potentially serious injuries from a rock slide on DIV B near Staging Area 2. A medivac was discussed by IC's but never implemented. NAS Fallon could not do it. This response involved reassigning paramedics and firefighters from an engine task force and the structure protection group; a trainee DIVS, the ordering of a heavy rescue squad and advanced life support units from CCFD. This rescue was based from Staging Area 2 adding more personnel, vehicles and confusion. The extractions took 5-6 hrs with one victim being extracted immediately prior to the burnover at Staging Area 2. The other victim was moved into black above Staging Area 2 before the burnover and was extracted about 1500. This medical situation diverted the attention of command away from the fire and the emerging situation. Bucket operations were also diverted to cooling the perimeter near the rescue operations limiting aerial support for other areas on the fire. The medical rescue contributed significantly to the complexity of the incident and to the vehicle congestion at Staging Area 2.

- ❖ **Transitions:** At approximately 0600 the structure of command and general staff changed with a replacement IC from NDF and an additional IC from the HTF. This resulted in 3 IC's working in Unified Command representing NDF, HTF, and CCFD. The lead IC was not clearly identified. The IC's also assumed other pertinent roles on the incident. At 0800 a complexity analysis was completed and a Type 2 team ordered. **The review board wants to identify a critical point:** that point being; even though there were three different philosophies of fire management functioning within the incident, from three represented agencies, command was functioning well until the time of the medical emergency. At 1200 incoming Type 2 team members started arriving for the in briefing by one of the Unified IC's. One Unified IC (CCFD) was not aware of the briefing. The other Unified IC (FS) departed for the fireline as OSC (T) on the Type 2 IMT, assuming their IMT had taken command of the fire at 1200. The original delegation of authority and WFSAs were developed prior to the 7/14/04 1200 briefing and rejected by the Type 2 IC at approximately 1300. The second delegation of authority and WFSAs were signed by the Forest Supervisor, Humboldt-Toiyabe National Forest and the State Forester, Nevada Division of Forestry at 2030 on 7/14/04 for a 7/15/04 0600 transition. The Type 2 Team began assuming operational responsibilities for the fire as early as 1600 on 7/14/04. No one clearly knows when the Type 2 Team took the fire.

- ❖ **Roles and Responsibilities:** Confusion resulted from numerous changes in personnel filling positions at the command, general staff and division supervisor levels. These changes were not communicated effectively leaving personnel not knowing who the IC was, or who was in charge at the OCS and DIV levels. There were Agency Administrators representing NDF, CCFD and the Forest Service. Responsibility for Staging Area 2 and traffic control on Kings Canyon road was not clear to the DIVS. There were some unassigned “free-lancing” fire management supervisors that entered the fire area and started directing resources without the approval or even the knowledge of Operations. This added to the confusion among the firefighters of who was actually in charge.
- ❖ **Operational and Tactical Decision Making:** The IC’s and the Ops Chief made a conscious decision to allow only those who had tactical assignments on the fire into Staging Area 2 to reduce congestion. Although this was recognized no one took action to implement restricting access into the area. A Staging Area Manager was not assigned. There was no traffic control established on the Kings Canyon Road leading into Staging Area 2. Direct attack from hand crews was ineffective without aerial support.
- ❖ **Entrapment:** Staging Area 2 personnel were not aware that the fire was spotting/spreading across the road. Vehicles parked alongside the road were left there as people migrated towards the fire. Twenty-one fire fighters and 18 vehicles were entrapped. (Of 36 vehicles at or near Staging Area 2, 18 were able to escape the burnover, 11 vehicles were not able to escape and sustained little or no damage, and 7 vehicles were destroyed or severely damaged.) This matches the definition of NWCG for an entrapment. Two people received first and second degree burns; one a media person and an engine operator. There was one fire shelter deployment inside a vehicle. Safety zones were identified as well as escape routes by the Type 3 organization. Employees interviewed were all surprised by the volume of personnel coming off the fire using the same escape route. Coming down were the Hot Shot crew, the Slide Mtn. Crew, engines and numerous overhead all trying to escape the same way. A Central Lyon Co. engine caught fire while stopping to let the Channel 4 news vehicle turn around and exit, this blocked the road for escape; the engine was abandoned and left without an operator or keys in the ignition. Numerous other vehicles were parked uphill and various fire personnel were not in required PPE. The road was wide enough for two vehicles but two separate vehicles were blocking the escape route. The burnover left three vehicles totally destroyed. Four other vehicles received moderate damage and numerous other vehicles received minor to moderate heat related damage. This was a Type 3 incident most of Command and General Staff personnel on the fire were qualified as Type 2. There was no evidence that indicated there were unqualified people on the incident functioning in positions they were assigned to. Neither the Unified IC’s nor the Agency Administrator received word of the burnover and entrapment in a timely fashion. Upon notification the OSC initiated an order for Type 1 IMT following consultation and approval of the FS Agency Administrator.

- ❖ **Management:** The IC's, AA and fire managers lacked a common understanding of transition from the Type 3 to Type 2 IMT's regarding the differences and normal timelines between in-briefing, transition, and the official take-over of the incident. There is no common interagency AOP of how Type 3 fires will be managed on multi-jurisdictional lands. Tactical operations are not covered with the current AOP, it mostly addresses cost apportionment. Assigned Type 3 FIO did not understand Nevada State laws regarding media access to the fireline. Media ceased to be managed after the notification of the medical emergency. Areas around the fire were not effectively closed to public prior to the entrapment.
- ❖ **Policy:** The team felt that during the time of IA and extended attack through the turnover at Staging Area 2, most fire suppression policies and procedures of the responsible agencies were followed. They have provided a table in the Factual Report that addresses the inconsistencies or areas of non-compliance.

Group Discussion on Above Findings:

- **Environmental/Fire Behavior:** **Steve** – Haines prediction was a “5” and that is what OSC based his tactical decisions on, it was actually a “4”.
Bob – Environmental conditions of the fire should not have been a surprise. Command was prepared for the chain of events to occur at 1700 not 1300.
- **Multi-Jurisdictional Incident Management:** Pete wanted to clarify that “Trigger Points” had been identified for the ordering of suppression resources, but not evacuation of suppression resources. The team finding within operations was that there were not defined “trigger points”. IC (CCFD) was an IC in the Unified Command organization. He realized he was there to represent CCFD as structure fire protection but he acted more in a liaison role.
- **Communications:** Who assigned the frequencies? (Command) Team findings were that the frequencies were well communicated. Interviews proved that no one was confused on what those frequencies were. The confusion stemmed from what frequencies fire personnel should be using, command or tactical. The question was asked if narrow/wide banding was an issue. The team stated, “No”. The narrow banding issues were identified early in the incident and avoided through state channel assignments.
- **Fire Fighting/Public Safety:** How is it that no one challenged the individuals that were on the fire line without proper authorization and without proper PPE? The team reported that some of the unassigned personnel were there without PPE, but most of the violators were “freelancers”. Branch Commander for Structures (CCFD) did direct people to get into their PPE. Were these failures for proper PPE agency specific? Team said their findings implied that the failures for proper PPE were across the board and fairly widespread. There were reports of 5-6 Chiefs and Battalion Chiefs up King Canyon Road just having a look around adding to the confusion and congestion.

Did the quality of the briefings improve as the incident went on? NO!

Could Air Ops have made a difference in stopping the rate of spread on the south end of the fire had they not had to concentrate their efforts on the medical? Doubtful!

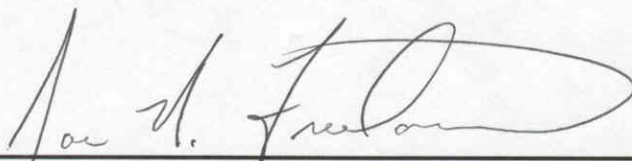
An IC (NDF) called a “heads-up” to local cooperators looking for possible additional resource assistance. This may have caused a sequence of events that added to more cooperators wanting to “check-out” the incident increasing the number of people and vehicles in an already congested area.

- **Transitions:** Who does the Sierra Front Type 2 IMT work for? It was explained that it is a wide interagency agreement for funding and cooperation. They ultimately work for the agency administrator of the hosting agency. Why did they not take the fire at 1200? The fire activity was increasing and it was not a good time to assume the responsibility of the incident.
- **Role and Responsibilities:** Who took the lead in directing personnel unofficially? Who directed the engine from Lyon Co. to attack the small spot fire while Ops was trying to get everyone off the line? The team found it was an NDF employee. Ops did not assign anyone to be the STGM of Staging Area 2.
- **Entrapment:** Why does report say that command was not notified in a timely manner? There was not a report back to the administrators that the burn over happened. When was the formal notification? Team reported, “during the transition meeting at approximately 1330”.
- **Management:** There was no clear understanding of what role the Type 2 team had prior to assuming command of the fire. It was not clearly defined or understood on the Sierra Front Team. Prior to take over, that team could have helped the T3 team implement. There needed to be concise direction on who had the fire. The T3 organization was fully engaged and then some. In the teams’ opinion, “the T2 organization missed some opportunities to help the T3 team be successful until the T1 team took over”. This leads to the teams recommendations on how “Waterfall” type fires will be managed on the Sierra Front. Dudley commented, “Sierra Front team is unique, a rapid response team for immediate support. Concern that we have added a complexity with unified command, this was a Type 3. This could be a national issue, with evacuations and medivacs. These Type 3 scenarios happen weekly along the Sierra Front for that matter in all wildland/urban interface areas. Are you going to have automatic unified command or the strongest leadership take control? This needs to be documented and implemented.”

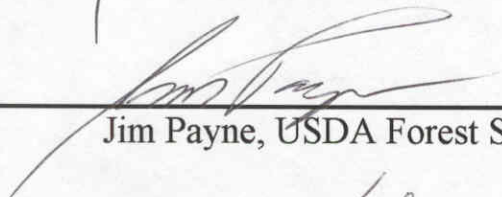
Dispatch knew who IC’s were, but the information was never relayed to the line.

The Investigation Team for the Waterfall Fire Burn Over

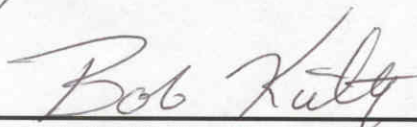
Carson City, Nevada



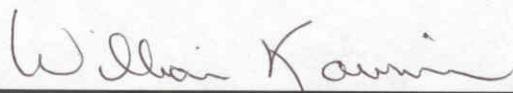
Team Leader—Joe Freeland, Bureau of Land Management, Elko



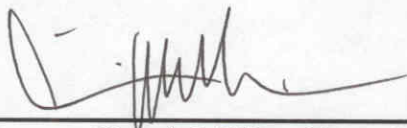
Jim Payne, USDA Forest Service (Retired)



Bob Kielty, Central Lyon County Fire District



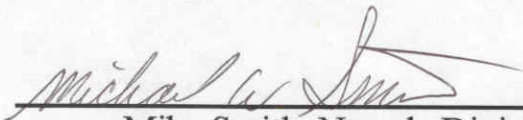
William Kourim, Clark County Fire Department



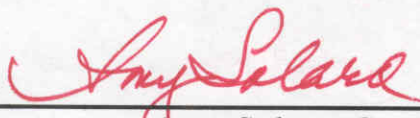
Butch Miller, Reno Fire Department



Carol Carlock, United States Forest Service, Inyo National Forest



Mike Smith, Nevada Division of Forestry, Nevada State Office



Amy Solaro, Central Lyon County Fire District

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Preface

The Waterfall Incident was initially dispatched at approximately 0257 July 14, 2004. The incident occurred in the hills to the West of Carson City, Nevada. The cause of the fire is being investigated by a separate investigation team and the cause of the fire is unknown at this time. The fire burned approximately 7500 acres as follows: private lands within Carson City protected by the Carson City Fire Dept (CCFD), private lands protected by the Nevada Division of Forestry (NDF) via the Sierra Forest Fire Protection District (SFFPD) and National Forest system lands under the protection of Humboldt-Toiyabe National Forest (HTF). The origin of the fire has been determined to be within Carson County on the HTF. Support to the above agencies was provided by the Sierra Front Wildland Cooperators.

Executive Summary

Prior to Initial Attack (IA) of Waterfall Fire

Carson City is located in Western Nevada at the eastern front of the Sierra Nevada Mountain Range. This area is commonly referred to as the Sierra Front. The portion of the Sierra Front that is on the western edge of Carson City is made up of steep canyons and slopes with urban developments immediately adjoining the wildland forest boundary. The road systems are a combination of paved, gravel, and unmarked single lane roads. Narrow roads on the sides of the slopes are common. Fuels on the west side of Carson City are comprised of open stands of Jeffery Pine, mountain brush, mixed grasses including cheat grass, and structures. Fuels could be described as continuous and fuel loading could be described as moderate to heavy.

Typically steep slopes and down canyon winds are key factors in fire spread and intensity in the Sierra Front. The National Fire Danger Ratings System (NFDRS) indices for the area during the time of the fire were above normal. Fire danger indices were above the 97th percentile for the area and potential for large fire growth was high.

Multi-jurisdictional fires with rapidly escalating complexity are common for the Sierra Front. The evolution of initial attack into a larger more complex extended attack organization is common under the conditions that existed on July 14, 2004. The HTF, NDF, and local fire departments have experienced several large, extended attack fires so far this season. These fires were contained with initial attack and extended attack organizations. Two fires required the activation of Type-2 Incident Management Teams (IMT).

Initial Attack through Burnover

Detection of the Waterfall Fire was at approximately 0257 on July 14, 2004 and an initial attack response was initiated by the CCFD and NDF. Upon arrival on scene, NDF and CCFD established Unified Command for the incident. At 0600 the HTF joined unified command and a Type-3 organization had been established with the IC's from NDF, HTF, and CCFD. The organization was made up of an Operations Section Chief (OSC), a Public Information Officer (PIO), Safety Officer (SOF), an Air Operations Branch Director (AOBD), an Air Tactical Group Supervisor (ATGS), three Division Group Supervisors (DIVS), a Structure Group Supervisor (DIVS), and a Staging Area Manager (STAM).

The fire was at least 20 acres, and was not yet accessible by vehicle. The mix of tactical resources included hand crews, engines, dozers, helicopters, and air tankers. A variety of homes were located within ¼ mile immediately east of the fire's location.

At approximately 0800, based on a complexity analysis, a Type-2 IMT was ordered. Primary considerations for these decisions were high potential for large fire growth and concerns for public safety within the wildland urban interface. The in-briefing for this IMT was scheduled for 1200.

Two staging areas were established. Staging Area 1 was at the Carson Middle School, with a Staging Area Manager (STAM) assigned. Staging Area 2 was established at the trailhead on Kings Canyon Road, without a STAM assigned.

Between 0900 and 1100 the fire activity continued to increase. The fire was at 50+ acres. Additional tactical resources arrived. Direct attack was still only effective with air support at this time.

At 1105, a handcrew reported two potentially serious injuries from rolling rocks. These injuries required first aid and a technical rescue, resulting in the diversion of tactical suppression resources from the structure protection group and Division B. In addition, emergency medical (EMS) personnel and equipment were dispatched from CCFD to provide technical rescue assistance. The response to these injuries increased radio traffic, drew tactical and strategic attention away from fire suppression, and increased vehicle traffic into Staging Area 2.

As the fire increased in size and complexity, uncontrolled access on the Kings Canyon Road allowed unauthorized personnel and vehicles to enter the area. Unauthorized personnel included private parties, unassigned fire and non fire personnel, members of the media and incoming Type-2 IMT members. Many of these people were without required escorts and/or Personal Protective Equipment. This situation resulted in a tremendous amount of congestion on the Kings Canyon Road and at Staging Area 2 prior to and during the turnover and entrapment.

Prior to 1200 the agency administrators, with support from the unified command, completed the Wildland Fire Situation Analysis (WFSA), Delegation of Authority, and their briefing materials for the Type- 2 IMT. In-briefing for the Type-2 IMT began at approx 1200. At this time, the unified commanders separated, one staying at the ICP, one participating in the Type-2 IMT in-briefing, and the other IC departed for the fire to begin the role of OSC2 (T) with the Type-2 IMT. Following the briefing the Type -2 IMT started the transition with the Type-3 IMT and officially assumed command of the fire at 1600 July 14, 2004.

At about 1230, the Type-3 OSC and DIVS B directed a burnout operation on the south end of the fire to keep the fire north and west of the Kings Canyon Road. As the crew and engine initiated the burnout, the main fire spotted over the road in several locations. (See appendix C Exhibit 6.) The spots grew beyond control immediately. DIVS B directed burnout operations to cease and his personnel to egress back down the road toward Staging Area 2. At this time congestion at Staging Area 2 prevented most vehicles from leaving the area, resulting in the entrapment and turnover of twenty one personnel and eighteen vehicles at approximately 1315. Two persons received first and second degree burns; one fire department employee and a news reporter. Vehicle damage included three vehicles destroyed and an unknown number of vehicles with lesser damage.

Development of Findings

Based upon site visits, interviews and a review of written and photographic documentation, the investigation team identified numerous findings in the following areas:

1. Environmental and Fire Behavior
2. Multi-Jurisdictional Incident Management
3. Communications

4. Firefighter and Public Safety
5. Transitions
6. Roles and Responsibilities
7. Operations and Tactical Decision Making
8. Entrapment
9. Management
10. Policy

Narrative:

Carson City is located in Western Nevada at the eastern front of the Sierra Nevada Mountain Range. This area is commonly referred to as the Sierra Front. The portion of the Sierra Front that is on the western edge of Carson City is made up of steep canyons and slopes with urban developments immediately adjoining the wildland forest boundary. The road systems are a combination of paved, gravel, and unmarked single lane roads. Narrow roads on the sides of the slopes are common. Fuels on the west side of Carson City are comprised of open stands of Jeffery Pine, mountain brush, mixed grasses including cheat grass, and structures. Fuels could be described as continuous and fuel loading could be described as moderate to heavy.

Recent weather within the area had been hot and dry. The Carson City area and surrounding mountains/desert has had a severe and protracted drought for the last several years. Vegetation had been stressed as a result, with current and previous year's fire behavior reflecting this drought condition. These conditions were present on the morning of July 14, 2004.

At approximately 0257 on the morning of July 14, 2004, Carson City Dispatch received a report of a brush fire in the timber above Kings Canyon. Upon notification, Carson City dispatched two brush engines, a rescue squad, and the on-duty Battalion Chief to the fire. Responding units reported active and intense fire behavior for that time of day. Initial attack units, prior to their arrival on the fire, requested additional resources were provided by NDF and other cooperating agencies within the Sierra Front.

The first unit, a Carson City Brush Engine, arrived on scene at approximately 0323. They sized up the incident at about 1 acre in heavy timber with some torching. At this time, NDF responded with initial attack units including two Brush Engines and a water tender. Notifications were made to the HTF, the City Manager of Carson City, and other cooperating agencies.

By 0430, the fire had grown to 5+ acres in size. Unified command was established with CCFD and NDF for the "Canyon Fire", which was later renamed the "Waterfall Fire". The fire was given a legal of T15N R19E Section 23. The Incident Commanders ordered additional resources including hand crews and aircraft. An Incident Command Post (ICP) was established on Longview Dr. From the ICP, staff was able to see all parts of the fire.

Access to the fire was from Kings Canyon Road. This road is paved through housing subdivisions up to the Kings Canyon Trailhead where Staging Area 2 was established. Single-lane dirt roads and a trail continued from this location providing access to the fire. Units en route to the fire for extended attack were asked to check in at Staging Area 1 at the Carson Middle School.

At 0600 the HTF joined unified command and a Type-3 organization had been established with the IC's from NDF, HTF, and CCFD. The organization was made up of an Operations Section Chief (OSC), an HTF Public Information Officer (PIO), Safety Officer (SOF), an Air Operations Branch Director (AOBD), an Air Tactical Group Supervisor (ATGS), three Division Group Supervisors (DIVS), a Structure Group Supervisor (DIVS), and a Staging Area Manager (STAM).

By 0700 the fire had spread south and east and was approximately 30-50 acres in size. Temperatures had risen 5-10 degrees in a matter of minutes. A spot-weather forecast was requested at 0720 and was returned and broadcast to the fire line by OSC at 0745. In addition, Staging Area 2 was established at the trailhead on Kings Canyon Road. A Structure Protection Group, with DIVS, was formed and deployed in the wildland urban interface along the Kings Canyon Road.

A fire cause determination investigation was initiated involving the Nevada State Fire Marshal's Office and HTF.

At approximately 0800, based on a complexity analysis, a Type-2 IMT was ordered. Primary considerations for these decisions were high potential for large fire growth and concerns for public safety within the wildland urban interface. The in-briefing for this IMT was scheduled for 1200.

At 1105, a handcrew reported two potentially serious injuries from rolling rocks. These injuries required first aid and a technical rescue, resulting in the diversion of tactical suppression resources from the structure protection group and Division B. In addition, emergency medical (EMS) personnel and equipment were dispatched from CCFD to provide technical rescue assistance. The response to these injuries increased radio traffic, drew tactical and strategic attention away from fire suppression, and increased vehicle traffic into Staging Area.

During the morning hours the Type-3 IMT recognized the potential for fire spread to the east into the urban area. Tactical plans for Division A included constructing direct handline from the point of origin south along the west side of the fire. Division B was to construct and burnout indirect fire line above Staging Area 2 along the east side of the fire. Tactical plans in Division B were to construct indirect dozer line in Staging Area 2. The burnout operation was abandoned and hand crews were deployed to construct direct handline along the east side of the fire. In addition, indirect dozer line was constructed between the direct handline and the Kings Canyon Road above Staging Area 2.

At about 1230, the Type-3 OSC and DIVS B directed a burnout operation on the south end of the fire to keep the fire north and west of the Kings Canyon Road. As the crew and engine initiated the burnout, the main fire spotted over the road in several locations south of them. The spot fires grew immediately beyond control, spreading back toward the main fire. Additional spotting and down canyon winds spread the fire to the east. Simultaneously, the north end of the fire was blowing up with high intensity, developing a significant column resulting in in-drafting. This situation, coupled with the down canyon winds, caused the south end of the fire to spread north and east, burning through Staging Area 2.

One Brush Engine was in the process of egressing Staging Area 2 when it stopped to allow a media vehicle to turn around and depart the area. There was not enough room between the Brush Engine and an additional media vehicle parked beside it to allow other vehicles and apparatus to pass, entrapping them within Staging Area 2. Twenty one personnel and eighteen vehicles were unable to egress out of the staging area. While this was occurring the fire front reached the Staging Area, igniting a pine tree adjacent to the Brush Engine. When the tree caught fire, it caused the Engine to ignite and burn in place. The Engine operator had to abandon the vehicle due to the extreme heat. Even though Personal Protective Equipment was used properly the

operator sustained first and second degree burns. An NDF Brush Engine with a front bumper mounted, remote controlled, water monitor applied water to other vehicles during the burnover. This “water curtain” helped limit the damage to vehicles and enhanced firefighter safety.

One media reporter abandoned their vehicle and walked out of the canyon, sustaining radiant heat burns to the face and hands. The personnel entrapped in Staging Area 2 sought sheltered from the heat and flames in their vehicles. One fire shelter was deployed within a vehicle due to the radiant heat. The burnover and entrapment occurred at approximately 1315.

The entrapment and burnover resulted in three agency vehicles, a CLCFPD Brush Engine, a CCFD Heavy Rescue Truck, and an HTF six passenger pickup being destroyed by the fire. Several additional vehicles received minor to moderate heat related damage.

Findings

Environmental & Fire Behavior

1. As a result of prolonged drought, fuel moistures were very low. Energy Release Components were above the 97% level. The potential of large fire growth was high with a predicted Haines Index of 5.
2. The fire was approximately 5 acres in size, near the waterfall in North Kings Canyon, and burning actively in the thermal belt mid-slope above the Kings Canyon Road.
3. The SOF3 took weather observations at the top of the fire and requested a spot weather forecast at 0720. The forecast was received from the NWS at 0730, and relayed to personnel on the fire via radio by the OSC at 0745.
4. Fire activity (intensity, spotting, and rates of spread) increased dramatically starting about 1200.
5. The blow-up on the north end of the fire and subsequent in-drafting contributed to the south end of the fire spread northeast and the burnover at Staging Area 2

Multi-Jurisdictional Incident Management

6. NDF was assumed to be the jurisdictional agency at the time of report and initial report.
7. Unified Command was established at initial attack (at approximately 0330) with an Incident Commander from both NDF and CCFD. They established an ICP at a park on Longview Drive approximately two miles east of the fire. The fire was in full view from the ICP.
8. The ICs discussed incident objectives, planned strategy and tactics, and issues of concern with their respective Agency Administrators, who concurred with the objectives and plan for managing the fire.
9. Command and Operations personnel recognized a high potential for significant downhill fire spread. Trigger points for initiating the disengagement and egress from the area were not identified, nor communicated, and responsibilities were not assigned.
10. Staging Area 1 was established at the Carson Middle School on King Street to receive incoming resources, with a staging area manager assigned.
11. The incident commanders conducted a complexity analysis at 0800, which supported their order for a Type 2 IMT for the Waterfall fire.

Communications

12. A communications plan was developed with the assignment of five radio frequencies including command, two tactical frequencies, air to ground, and air to air.
13. Poor radio discipline and/or not using assigned radio frequencies resulted in tremendous radio traffic on both command and tactical frequencies. Due to radio traffic congestion many overhead personnel reverting to home unit (unassigned) frequencies and cell phones for many of their communications. As a result, critical conversations were not available for all personnel who had a “need to know”, creating more confusion regarding fire status and firefighting actions.

Firefighter and Public Safety

14. All assigned resources received a briefing prior to assignment. The quality of the briefings varied widely from full coverage of the elements in the Incident Response Pocket Guide to no information other than the tactical assignment and radio frequencies.
15. Lookouts were posted at the single resource, strike team/task force, and division/group levels. In addition, the Operations Section Chief (OSC) provided lookout coverage at the ICP and via the assigned ATGS. The SOF3 served as a lookout at the top of the fire for most of the morning.
16. All resources interviewed had identified escape routes and safety zones.
17. Numerous assigned and un-assigned overhead personnel were in the fire area without wearing their personnel protective equipment.
18. Uncontrolled access into Staging Area 2 resulted in numerous private parties, unassigned fire and non-fire management personnel, members of the media, incoming Type 2 IMT members, and all of their associated vehicles entering the fire area via the Kings Canyon Rd. Many of these people were in supervisory or command positions within their respective fire protection agencies but were not assigned to the Waterfall fire. Many of these intrusions into the area were without the approval of the ICs, without required personal protective equipment, and in some cases without required escorts. Many of these individuals and their vehicles were present in the area of Staging Area 2 during the blowup on the south end of the fire and the subsequent entrapment at Staging Area 2. This situation compromised the safety of tactical firefighting personnel and their ability to escape the entrapment at Staging Area 2.
19. Numerous command and operations overhead personnel and visiting agency fire command personnel observed the heavy congestion at Staging Area 2 and on Kings Canyon Rd. and recognized the potential problems. None of them affected any effective actions to resolve this hazardous situation.
20. Check-in procedures did not provide a complete accounting of all the personnel assigned to fireline duties and/or allowed into the fire area. Personnel accounting existed within the structure protection group and within the strike teams/task forces and individual resources, but was incomplete above these levels of the fire organization.

21. The SOF3 temporarily pulled two hand crews off Division A due to increasing fire behavior, unanchored line, and a spot fire downhill from their location.
22. Evacuations of homes and private parties in danger were accomplished using established procedures and appropriate law enforcement personnel.
23. At 1105 two firefighters on the Slide Mt. hand crew received potentially serious injuries from falling rocks on Division B near Staging Area 2. The medical and rescue response involved reassigning paramedics and firefighters from an engine task force and the structure protection group, an assistant DIVS, and the ordering of a heavy rescue squad and advanced life support units from CCFD. The base of operations for this rescue was Staging Area 2. This rescue operation lasted for several hours. One victim was extracted immediately prior to the turnover at Staging Area 2. The other victim was moved into the black above Staging Area 2 before the turnover and was extracted about 1500.
24. The medical rescue operation significantly contributed to the complexity of incident management for the Type 3 organization and to the vehicle congestion at Staging Area 2.
25. Helicopter bucket operations were diverted to cooling the fire perimeter near the rescue operations resulting in limited aerial support for other areas on the fire.
26. Trigger points for disengagement and egress were not identified or commonly understood, no contingency plan was in place when expected events happened.

Transitions

27. At approximately 0600 the command and general staff structure changed with the arrival of a replacement IC from NDF and an additional IC from the HTF. The change resulted in three ICs working in Unified Command representing NDF, HTF, and CCFD. A lead IC role was not clearly assigned or understood. Also at this time, the ICs filled the following positions: Safety Officer, Information Officer, Operations Section Chief, Division A Supervisor, Division B Supervisor, Division Z Supervisor, Structure Protection Group Supervisor, and Air Operations Branch Director.
28. At approximately 1200, one of the unified ICs and agency representatives and/or administrators provided an initial briefing to the incoming Type 2 IMT at Staging Area 1. One Unified IC was not aware of this briefing. The other Unified IC departed for the fireline as OSC (T) on the Type 2 IMT assuming their Type 2 IMT was taking over management of the fire at 1200.
29. Transition to the Type 2 IMT occurred at 1600 July 14, 2004. The decision to transition to the Type 2 IMT at 1600 was not positively communicated to the Type III ICs. This led to erroneous assumptions on their part. This led to at least one IC disengaging as a commander.

Roles and Responsibilities

30. There were numerous changes in personnel filling positions in the incident management organization at the command, general staff, and division supervisor levels. Many of these changes were not announced to superiors or subordinates. The changes were not relayed effectively to the management at Staging Area 1 for use in briefing incoming firefighting resources. As a result, some confusion existed about the names of the ICs and who was in charge at the OSC and DIVS levels.
31. Responsibility for the management of Staging Area 2 and traffic on the Kings Canyon Rd. was not fully understood or accepted by the DIVS.
32. Some unassigned “free-lancing” fire management supervisors entered the fire and started giving tactical direction and assignments to resources without the knowledge or approval of operations overhead. These actions created confusion among firefighters about who was in charge. These actions may have contributed to untimely delays for disengagement.

Operations and Tactical Decision Making

33. An Air Tactical Group Supervisor arrived over the fire at 0619 and immediately ordered airtanker and helicopter resources. The first Single Engine Airtanker (SEAT) was en route to the fire at 0656.
34. Crews constructing direct handline with aerial support could not get anchor points established on the north end of the fire at the Division A/B break.
35. Staging Area 2 was established at the Kings Canyon Trailhead at the end of the pavement on the Kings Canyon Road, which is locally known as Staging Area 2. This area was used as a reporting location for resources with tactical assignments in Division B and the Structure Protection Group. It was also used as a staging area for the fire investigation team and medical rescue operations. A staging area manager was not assigned.
36. The ICs and OSC recognized the potential for heavy congestion of people and vehicles at Staging Area 2 and agreed to limit access to only resources that had a tactical assignment. Their actions to implement this decision were ineffective. There was no positive traffic control established on the Kings Canyon Rd. leading into Staging Area 2.
37. Direct attack with hand crews was ineffective without aerial support, primarily from helicopters with water buckets.

Entrapment

38. Personnel at Staging Area 2 were not advised about the buildup of fire activity south of their location nor the fire front spreading toward them.
39. Due to some improperly parked vehicles at Staging Area 2 (pointed opposite of egress route), vehicles without operators present, and congested two way vehicle traffic on the

Kings Canyon Rd. below Staging Area 2, twenty one firefighters and eighteen vehicles were not able to evacuate the area and were burned over by the fast spreading fire front at approximately 1315.

40. This burnover incident matches the National Wildfire Coordinating Group's definition of an "entrapment".
41. The operator of a Central Lyon Co. engine stopped his egress at the exit of Staging Area 2 to allow a news media vehicle heading up the road to turn around and exit the area. While waiting, a pine tree adjacent to the road crowned out and ignited the front of his engine and disabled it. This engine operator received burns and abandoned his vehicle. This event blocked any additional vehicles egress from Staging Area 2.
42. Most personnel entrapped stayed inside vehicles at Staging Area 2 while the fire burned through the area. One entrapped engine with a front bumper mounted, remote controlled water nozzle/monitor was able to apply water to other vehicles during the burnover which helped limit damage to vehicles and enhanced firefighter safety.
43. One fighter deployed a fire shelter inside their vehicle to assist with reflecting radiant heat. No other shelter deployments occurred at Staging 2.
44. Two people received first and second degree burns during the burnover. A television reporter received radiant heat burns as he walked down Kings Canyon Rd. below Staging Area 2. An engine operator also received first and second degree burns when radiant heat entered the cab of the engine through an open passenger side window, forcing him to exit the vehicle and flee to safety in another vehicle.
45. Following the passing of the fire front, personnel emerged from their vehicles and engines and started extinguishing fires on entrapped engines and support vehicles.
46. Three vehicles (CCFD Heavy Rescue Squad, Central Lyon County Brush Engine, and a FS pickup) were totally destroyed. Four other vehicles received moderated heat related damage at Staging Area 2. Numerous other vehicles departing the area as the burnover occurred sustained minor to moderate heat related damage.
47. Neither Unified ICs nor Agency Administrators were advised of the burnover and entrapment in a timely manner.
48. Upon notification of the burnover and entrapment, the OSC initiated an order for a Type 1 IMT following consultation with and approval of the FS Agency Administrator.

Management

49. ICs, Agency Administrators, and fire managers lacked a common understanding of transitions from Type 3 to Type 2 IMTs regarding the differences and normal timelines

between in-briefing, transition, and official takeover. The lack of understanding lead to assumptions and misunderstandings that the Type 2 IMT was taking over the fire at 1200.

50. All organizational levels did not have a common understanding of how Unified Command functions nor the roles and responsibilities of each IC on Type 3 incidents like the Waterfall Fire.

51. The local agencies lack a single common interagency operating plan for managing Type 3 fires burning on multiple jurisdictions.

52. Assigned Type 3 Incident Information Officer did not understand Nevada State Law regarding media access to the fireline.

53. Areas around the fire were not closed to public entry prior to the entrapment.

Policy

54. During the time period of initial and extended attack through the burnover at Staging Area 2, most fire suppression policies and procedures of the responsible agencies were followed. However, in some cases either action or inaction by firefighters resulted in policy and/or procedural non-compliance. The following table provides a summary of these areas of non-compliance.

Policy/Procedure	N D F	C C F D	F S	Remarks
All activities shall reflect a commitment to firefighter and public safety as a first priority. NDF FPM pg. 22, CCFD SOP O4, FSM 5135	X	X	X	Access on Kings Canyon Rd. was not controlled or managed. Safety was not the first priority at Staging Area 2. Incomplete accounting of assigned personnel.
Identity of IC will be known at all times by Dispatch and all subordinates. NDF FPM pg. 36, CCFD SOP C1, NIMG	X	X	X	Several resources assigned didn't know who the ICs were and/or there was Unified Command established.
Ensure compliance with established safe firefighting practices... NDF FPM pg. 51, CCFD SOPs, FSM 5130.04	X	X	X	Firefighters and Overhead recognized safety hazards and risks with congestion on the Kings Canyon Rd. yet took no effective action to mitigate issues.
Use of Personal Protective Equipment NDF FPM pg. 57, CCFD SOP S4, ISFFAO Ch.6	X	X	X	Assigned and unassigned personnel were at Staging Area 2 without full PPE during the burnover.
Incident briefings occur throughout the fire organization and cover the elements	X	X	X	Assigned firefighting resources did not receive a briefing covering

in the Incident Response Pocket Guide. NDF FPM pg. 59 & 131, CCFD SOP C1, FSM 5130.45				the items in the IRPG.
Visitors to the fireline must be authorized by the IC, have full PPE, and be escorted if not red carded. NDF FPM pg. 68, ISFFAO Ch. 6	X	n / a	X	Unassigned agency fire and administrative personnel, media personnel, and civilians were allowed on Kings Canyon Rd. and at Staging Area 2 without approval, PPE, and/or escorts.
Dispatcher will, during initial dispatch, assign one each of the following frequencies: Command, Tactical, Air to Ground, Air to Air. NDF/HTF AOP pg.12, CCFD SOP C1	X	X	X	All four frequencies were assigned but not by agreed upon procedures.
Ensure that all firefighting actions are in full compliance with the Ten Standard Fire Orders and mitigation of the applicable Eighteen Watch Out Situations. NDF FPM, FSM 5135.45	X	n / a	X	**Fire Order #7 and Watch Out #7. Communications were not maintained with supervisors and adjoining forces. Fire Order #9. Control of subordinates to ensure performance of critical duties was inadequate. Fire Order #8. Briefings and instructions were inadequate. Watch Out #8. Unanchored fireline was being constructed. Fire Order #10. Safety considerations were not the first priority at Staging Area 2.
Levels of engagement shall be determined by and based upon iterative risk assessment and management (IRPG). NDF FPM Pg. 132, FSM 5135.4	X	n / a	X	No evidence of the risk assessment and management process being formally used.

NDF FPM Nevada Division of Forestry Fire Protection Manual
 CCFD SOP Carson City Fire Department Standard Operating Procedure
 FSM Forest Service Manual
 ISFFAO Interagency Standards for Fire and Fire Aviation Operations
 NDF/HTF AOP Nevada Division of Forestry & Humboldt-Toiyabe NF Annual
 Operating Plan
 NIMG National Interagency Mobilization Guide

X = Agency has established policy and/or applicable procedures
 n/a = Agency has no established policy/procedure

**** Fire Orders and Watch Outs that were violated or not mitigated.**

Fire Orders: #7 Maintain prompt communications with your forces, your supervisor, and adjoining forces.

#8 Give clear instructions and insure they are understood.

#9 Maintain control of your forces at all times.

#10 Fight fire aggressively, having provided for safety first.

Watch Outs: #7 No communication link with crewmembers or supervisor.

#8 Constructing line without safe anchor point.

Appendix A

Exhibit 1**List of personnel on fire**

Bureau of Indian Affairs- 17 personnel

Carson Sheriff – 2 personnel

Carson City Fire Department- 14 personnel

Central Lyon County Fire Protection District- 6 personnel

Nevada Division of Forestry- 102 personnel

United States Forest Service- 14 personnel

North Lake Tahoe Fire Protection District- 21 personnel

Storey County Fire Department- 4 personnel

East Fork Fire and Paramedic District- 6 personnel

Nevada State Fire Marshall- 1 personnel

Nevada Appeal- 1 personnel

News Channel 8- 2 personnel

News Channel 4- 2 personnel

Carson City BLM NV-3 personnel

Reno Fire Department- 1 personnel

Exhibit 2
List of Interviewees

Morning Star IHC- 17 personnel

Carson City Fire Department- 9 personnel

Carson City BLM NV. - 2 personnel

Central Lyon County Fire Protection District- 6 personnel

Nevada Division of Forestry- 13 personnel

United States Forest Service- 6 personnel

North Lake Tahoe Fire Protection District- 2 personnel

Storey County Fire Department- 4 personnel

East Fork Fire and Paramedic District- 4 personnel

State Fire Marshal- 1 personnel

Mason Valley Fire Protection District- 3 personnel

Nevada Video Production- 1 personnel

News Channel 8- 1 personnel

News Channel 4- 2 personnel

Appendix B

WATERFALL INCIDENT 7/14/04

TIME	ACTIVITY
2:57 AM	BRUSH FIRE REPORTED IN KING'S CANYON
2:57 AM	CCB-1, B-2, R-1, TRNG-1, NDB, NDB02 REQUESTED TO RESPOND
3:00 AM	REPORT OF FLAMES SEEN ABOVE TIMBERLINE-KING'S CANYON
3:06 AM	FIRST ALARM TONED
3:07 AM	NDF ADVISED-TENDERS AVAILABLE
3:09 AM	NDF REQUESTED TO SEND HAND CREWS ABOVE WATERFALL
3:23 AM	CCB-1 ON SCENE, FIRE IN HEAVY TIMBER, EXCESS OF 1 ACRE IN DITCH
3:25 AM	FIRE STARTING TO CROWN, NDF INITIAL ATTACK UNITS-B-10, B-101, WT-102 RESPONDING
3:28 AM	REQUEST NOTIFY FOREST SVC OF SITUATION IN KING'S CANYON
3:30 AM	CCR-1 IN STAGING
3:30 AM	INITIAL ATTACK IN PROGRESS
3:33 AM	FIRE REPORTED AT 3+ ACRES
3:36 AM	CARSON CITY MANAGER NOTIFIED OF INCIDENT
3:39 AM	CCB-2 ON SCENE
3:44 AM	7106 NOTIFIED OF INCIDENT
3:49 AM	NDF BRUSH 10 (B-10) ON SCENE
3:50 AM	NDF BRUSH 101 (B-101) ON SCENE
3:51 AM	NDF WT102 ON SCENE
3:52 AM	NDF ORDER 4 HAND CREWS
3:52 AM	NDF TRNG-3 AND BC-3 ON SCENE
3:53 AM	CCTRNG-1- USE CHANNEL NDF-3
4:03 AM	NDF-105 ORDER SEATS AND AA FOR 0700
4:13 AM	TRNG-1 ADVISE OF UNIFIED COMMAND- "CANYON FIRE"
4:13 AM	TRNG-1 ANNOUNCE NDF BC-3 PRIMARY IC
4:13 AM	PER NDF-105-FIRE LOCATED AT 15N 19E SEC23
4:18 AM	NDF BC-3-UNIFIED COMMAND WITH CCFD UNTIL APPROX. 0600 THEN TO NDF-105
4:20 AM	NDF CAPT. AND FF AT STATION
4:21 AM	FIRE RE-NAMED "WATERFALL FIRE"
4:24 AM	FIRE REPORTED AT GREATER THAN 5 ACRES
4:36 AM	CCR-11 ON SCENE
4:52 AM	FIRE REPORTED GOING UP THE RIDGE- SIZE OF 10-15 ACRES
5:08 AM	NDF BATTALION 4 (BC-4) ON SCENE
5:16 AM	DIVISION A IS NDF TRAINING 3
5:33 AM	PIO NOTIFIED OF INCIDENT
5:37 AM	NDF BC-3 ORDER 2 TASK FORCE LEADERS TO REPORT TO MIDDLE SCHOOL
5:55 AM	TRNG-1, PREV-1 ON SCENE-UNKNOWN WHAT TIME
5:55 AM	WINDS REPORTED AS CALM AT FIRE, CCB-1 AS LOOKOUT
6:00 AM	ORGANIZATIONAL UPDATE- COMMAND: NDF, CCFD, USFS; OPERATIONS: NDF; SAFETY: USFS; AIR OPS: USFS; STAGING: NDF; DIVISIONS: A-NDF, B-NLTF, Z-NDF
6:00 AM	EXTENDED ATTACK IN PROGRESS, ADDITIONAL RESOURCES BEING ORDERED
6:05 AM	NDF DOZER 1 (D-1) ON SCENE
6:11 AM	NDF BRUSH 111 (B-111) ON SCENE
6:15 AM	GOOD FIRE ACTIVITY ON EAST FLANK ON TOP OF RIDGE. TEMP RISE 5 DEG IN 10 MINS.
6:30 AM	CCPREV-1 ON SCENE
6:44 AM	WINDS REPORTED COMING OUT OF THE SOUTHEAST
6:57 AM	USFS 7106 REQUEST INFORMATION ON A/T
6:59 AM	BC-2 STATE CCB-1 RETURN TO STAGING #2, JOIN WITH B-2 FORMING STRUCTURE PROT. TEAM ON WH-1
7:15 AM	NDF-101 ON SCENE

7:20 AM SPOT FORCAST REQUESTED-RENO HAVING TROUBLE AND REFER TO
ELKO TO DO IT
 7:24 AM SLIDE MOUNTAIN ON SCENE
 7:30 AM SPOT FORCAST RETURNED, USFS WITH AIR AND TACTICAL OPS
 7:32 AM NDF BRUSH 11 (B-11) ON SCENE
 7:34 AM 7DL ADVISE FIRE IS AT 30-50 ACRES WITH ACTIVE FLAMES
BUMPING OLD BURN-HEAVY TIMBER NO TORCHING AT THIS TIME BUT
A LOT OF ACTIVE GROUND FIRE
 8:15 AM PER 7131- ARRIVED AT STAGING
 8:20 AM SOUTHWEST GAS REQUESTED AT COMMAND POST
 8:35 AM USFS 7135 ON SCENE
 8:38 AM USFS 7175 ON SCENE
 8:41 AM NDF SILVER SPRINGS CREWS 1 AND 2 ARRIVED AT WATERFALL
STAGING
 8:49 AM DISPATCH HEAR TRAFFIC-WILL NOTIFY NDF-1 INJURY FROM INMATE
CREW-ROCK TO KNEE
 8:50 AM NDF BC-3-BACK IN SERVICE EN ROUTE TO CARSON
 8:52 AM INJURED INMATE, STAGING AREA 2 TOP OF KING'S CANYON, ROCK
TO KNEE
 9:16 AM PER NDF CAPT.: WITH FF, EN ROUTE TO FIRE
 9:21 AM DISCUSS WITH NDF-105 NDF EMPLOYEE BE REASSIGNED TO LSC2
 9:31 AM NDF FF AT STAGING WITH CAPTAIN
 10:19 AM PER OCEAN 4-POINT OF ORIGIN IS 39N 09E SEC27 X 119N 49E
SEC46-UNKNOWN IF USFS OR PRIVATE, UNDER INVESTIGATION BUT
DEFINITELY HUMAN CAUSED, AT BOTTOM OF DRAINAGE, W/ USFS LEO
 11:05 AM SLIDE MOUNTAIN CREW- TWO CREW MEMBER ROCK-RELATED INJURIES
 11:36 AM PER CCTRNG-1-SUBJECT WITH BROKEN KNEE ABOVE STAGING AREA 2
AT TOP OF KINGS CANYON-NEED RESCUE
 11:52 AM PER CCTRNG-1-DISPATCH SECOND RESCUE ON SEPARATE CALL AT
STAGING AREA 2
 11:54 AM PER NDF 105-MEDICAL IS SLIDE CREW MEMBER, BROKEN LEG, IS IN
PRECARIOUS SITUATION HELO'S DOING BUCKET DROPS TO KEEP FIRE
AWAY, HAVE AMBULANCE UP NEAR THEM AND ARE TRYING TO WORK
THE PERSON DOWN
 11:54 AM NO ASSISTANCE NEEDED FROM MINDEN. NLDFT BATT CHIEF TO BE
NOTIFIED BECAUSE IT IS HIS CREW MEMBER
 11:55 AM PER CCTRNG-1-DISPATCH E-1 IN SQUAD-1
 11:55 AM DISPATCH HEAR CARSON TONE OUT RESCUE SQUAD TO ASSIST WITH
INJURY
 12:00 PM NDF ASSUME OPS, USFS AT ICP AS ASSISTANT OPS, TRANSITION
FROM TYPE III TO TYPE II IM TEAM
 1:15 PM APPROXIMATE: BURNOVER AND ENTRAPMENT OCCURS
 1:28 PM A TYPE ONE TEAM IS REQUESTED BY USFS 7106 DUE TO INJURY AND
POSSIBLE LOSS OF STRUCTURES
 1:47 PM DISPATCH OVERHEARD CONVERSATION OF 1 STRUCTURE LOST, 3
AGENCY VEHICLES
 1:47 PM ANNOUNCED LOSS OF BOTH SIDES OF ASH CANYON-1 STRUCTURE
LOST, 2 AGENCY VEHICLES, 1 PRIVATE VEHICLE
 1:48 PM EXTENDED ATTACK IN PROGRESS, STRUCTURE PROTECTION CONTINUES
 1:48 PM NOTIFIED TO CARSON TO CLOSE KINGS CANYON ROAD AND ORMSBY
ROAD
 1:52 PM STRUCTURE FIRE AT 4340 KINGS CANYON
 1:54 PM NDF BC-3 NOTIFIED DUPUTY OPS-BLEW OUT BOTH SIDES OF ASH
CANYON, 1 STRUCTURE
 CONFIRMED LOST, 3 AGENCY VEHICLES, 1 PRIVATE VEHICLE
 DESTROYED- 2 MINOR BURNS, ALL PERSONNEL ACCOUNTED FOR, CREW
 MEMBER WITH INJURY-UNKNOWN STATUS

2:07 PM FROM OCEAN 4- LOST VEHICLES: CCFD HEAVY RESCUE, CHANNEL 8
VEHICLE, LYON CO BRUSH 35, NDF DOZER SUPPORT VEHICLE, OCEAN
4 VEHICLE LOST TAILLIGHTS

2:30 PM DAMAGE TO CHANNEL 4 NEWS VEHICLE, CITIZEN WITH SECOND
DEGREE BURNS EN ROUTE TO HOSPITAL

Appendix C

Fire Behavior

Weather/Climatology

The Carson City area and surrounding mountains/desert has had a severe and protracted drought the last several years. Vegetation/fuels have been stressed as a result. Previous years as well as earlier fire events this year witnessed extreme fire behavior events; indicative of the protracted drought and resulting fuel condition.

Review of two Remote Area Weather Stations (RAWS), Little Valley (Non-NFDRS) and Galena indicate no significant rainfall during the prior seven days in fire weather zone (450).

National Weather Service Fire Weather forecasts (Reno office) from Tuesday July 13, 2004 and Wednesday July 14, 2004 predicted that the weather pattern in the area would continue for the next several days. An upper level ridge over the Southwest US continued to keep conditions dry and warm throughout the area. Winds at the 20' level were expected to be from the Southwest 10-15 mph with gusts to 25 mph. Predicted relative humidity during the day was 8-13%, with evening recoveries to 30-40%. A predicted Hanes index of 5.

Appendix C Exhibit 1

Live fuel moistures from the Warm Springs (CCD) monitoring site indicated LFM of 102%. Observations from the fireline on July 14, 2004 provided the following information:

0650 Elev. 6000 Ft Temp 62° Rh 21% Winds 17 mph (eye level)

Observations were taken at top of the ridge.

0800 Elev. 5500 Ft Temp 68° Rh 18% Winds- light upslope

Observations were taken in the canyon bottom.

These observations have been used in formulation of the fire behavior calculations.

Fuel Conditions

The most notable fuel condition is the drying of the 1000 hour Time Lag Fuel Moisture (TLFM). Data collected (July 5, 2004) from the Great Basin Live Fuel Moisture Project (GBLFMP) indicates a six (6) % 1000 TLFM from the Markleeville monitoring site. This site is south of the incident on Carson City BLM lands.

The most recent sampling of Live Fuel Moisture (LFM) from the Warm Springs monitoring site (July 5) indicated a LFM of 102%. This figure places the predicted fire behavior at the upper end of the high category approaching the extreme fire behavior category.

One Hour Time Lag Fuel Moisture (TFLM) can be an indicator of extreme fire behavior conditions. One hour fuel moistures were calculated at 7% using the 0650 weather observations. Using the information from the spot forecast Probability of Ignition is 80% at 0800.

Fuels

The fuels above the Kings Canyon Road are comprised of stringers and groves of Jeffery Pine, mixed brush types and mixed grasses including cheatgrass. The areas below the Kings Canyon

road consist of mixed brush and grasses that are interspersed in open stands of Jeffery Pine. Fuels are continuous throughout the area. Fuel loadings are moderate to heavy. Fuels covered from 60 to 80 % of the area. The primary Fire Behavior Fuel Model selected for calculations is FM 6, Dormant Brush and Hardwood Slash.

Appendix C Exhibit 2

Topography

Topography of the area consisted of slope between 16 -70% above the burnover site and 0-15% below the burnover site.

Appendix C Exhibit 3

Fire Behavior Summary

Fire Behavior calculations were completed using Behave+ Ver.2.02 software. Inputs were obtained from weather observations from the scene and from National Weather Service (Reno office) fire weather forecasts. Remote Automated Weather Station (RAWS) data was obtained from the Little Valley RAWS station and Galena RAWS station. Weather observations from the field were used to obtain Waterfall Spot weather forecast at 0730 on July 14, 2004.

Appendix C Exhibit 4

Data from the Galena RAWS station was used in the formulation of Waterfall Spot1 weather forecast obtained at 1341 on July 14, 2004.

Appendix C Exhibit 5

Based on calculations, rates of spread in the area of concern were calculated to be 60 chains per hour (3960 ft). Flame lengths could be expected 6-15 feet. Spotting in front of the flaming front could be expected up .3 mi (1584 ft) ahead of the fire.

The Waterfall Fire apparently started from a campfire in the upper Kings Canyon drainage, west of Carson City on July14, 2004. The fire was reported around 0257 that morning. First arriving units reported fairly active fire behavior for that time of day and the fuel type the fire was in. The fire was burning in a somewhat closed stand of Jeffery Pine. The slope in the area of the origin is from 31-60 %. Temperatures were estimated to be 50-60°F. Relative Humidity was estimated to be around 20-30%. Winds were light and up-canyon.

The active fire behavior for this time of day has been attributed to a thermal belt in the canyon areas around 5500-6500 feet. Using the 0650 weather observations the calculated Rh would be 39% at that time of day. The measured Rh was actually 21%. This is an indicator that the area was influenced by a thermal belt.

The fire made several fairly active uphill runs with torching trees during the morning hours. The fire was on a West aspect uninfluenced by daytime heating.

At around 0900 the fire was reaching the top of the ridgeline. Spot fires on the eastern aspect were becoming active. These fires were picked up by crews using direct attack tactics. The main movement of the fire was to the south through a stand of Jeffery Pine.

As the fire moved out of the timber line and into areas of brush and grass understory, which was receiving solar heating, fire activity began to increase. Fire activity was moderate and within predicted limits.

Appendix C Exhibit 6

After 1230 conditions began to change that would significantly affect the fire. Winds were beginning to shift to a down canyon flow from the southwest. As the wind shift met with the fire, fire whirls began developing on southern edge of the fire. As the fire whirls continued to develop and move down slope towards the Kings Canyon road.

At around 1250 spot fires were becoming established below the Kings Canyon Rd. The main fire above the road was spreading across the face of the slope by the southwest winds.

The spot fires below the road were fairly active. An attempt was made to contain the spot fires with direct attack tactics. As the amount of spot fires began to increase above and below the road direct tactics were ineffective and abandoned.

After 1300 the spot fires below the road had become a fast moving fire in brush and understory on the lower slope. Fire behavior predictions estimated rates of spread in this area at 60 chains per hour. From 1300 to approximate time of burnover 1315 the fire is estimated to have moved approximately 900 feet in the direction of the Staging Area 2.

This information is verified by calculating how fast the fire is estimated to be moving per minute. The rate of spread is 66 ft per minute. Calculations estimate that it would take 13.5 minutes to move into the Staging Area 2.

After factoring in the spotting component, torching trees and the increasing winds, extreme fire behavior occurred and has been validated with eyewitness accounts and photographic evidence.

At the roads edge in the Staging Area 2, there were numerous large fully mature Jeffery Pines (24" dbh or greater) interspersed with brush and understory. These trees had branches near the ground. These branches contributed to the fire spreading through several of these trees during the burnover. Other smaller trees were also torching along the roads edge. Debris and ember fallout along with radiant and convective heat from these torching trees ignited several parked vehicles.

The burnover event is estimated to have lasted approximately 2-5 minutes in duration.

Another factor that contributed to the extreme fire intensity at in the Staging Area 2 was the simultaneous blow-up of the north end of the fire. As a result of this blow-up, up-canyon winds were funneled from the drainages below this area. This in-draft was a contributing factor to the fire being drawn into the Staging Area 2.

Appendix C Exhibit 7

FNUS55 KREV 131421
FWFREV

FIRE WEATHER PLANNING FORECAST FOR NORTHEAST CA AND WESTERN NV
NATIONAL WEATHER SERVICE RENO NV
730 AM PDT TUE JUL 13 2004

...ISOLATED DRY THUNDERSTORMS POSSIBLE ON THURSDAY BEFORE
TRANSITIONING INTO WETTING THUNDERSTORMS THURSDAY NIGHT AND FRIDAY...

.DISCUSSION...
DRY AND WARM CONDITIONS WILL CONTINUE THROUGH WEDNESDAY NIGHT AS AN
UPPER LEVEL RIDGE REMAINS OVER THE SOUTHWEST US. MONSOON MOISTURE IS
EXPECTED TO REACH ZONES 459 AND 273 BY THURSDAY AFTERNOON WITH
ISOLATED DRY THUNDERSTORMS POSSIBLE. BY THURSDAY NIGHT AND FRIDAY...
INCREASED TROPICAL MOISTURE WITHIN THE MONSOONAL FLOW MAY PRODUCE
WETTING RAIN OVER SOME AREAS. BY THIS WEEKEND...DRY CONDITIONS ARE
EXPECTED TO RETURN WITH LOCALLY BREEZY CONDITIONS POSSIBLE IN THE
AFTERNOON AND EVENING.

NOTE: THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS
NOTE: PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
WWW.WRH.NOAA.GOV/RENO/FIRE

NVZ450-453-132330-

NV ZONE 450 WESTERN NEVADA INCLUDING CARSON CITY, DOUGLAS AND
STOREY COUNTIES, SOUTHERN WASHOE COUNTY AND LYON
COUNTY

REGION INCLUDES: A PORTION OF THE HUMBOLDT TOIYABE NF

NV ZONE 453 WEST CENTRAL NEVADA BASIN AND RANGE INCLUDING
PERSHING AND CHURCHILL COUNTIES, EAST-CENTRAL
WASHOE COUNTY, AND NORTHERN LYON COUNTY

730 AM PDT TUE JUL 13 2004

.TODAY...
SKY/WEATHER.....SUNNY.
MAX TEMPERATURE.....
VALLEYS.....88-98.
MID SLOPE.....84-93.
24 HR TREND.....LITTLE CHANGE.
MIN HUMIDITY.....
VALLEYS.....7-12%
MID SLOPE.....9-16%
24 HR TREND.....LITTLE CHANGE.
20-FOOT WINDS.....
VALLEYS/SLOPE...UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
WITH LOCAL GUSTS TO 30 MPH IN THE AFTERNOON.
RIDGE TOP.....SOUTHWEST 10 TO 20 MPH.
HAINES INDEX.....5.
LAL.....1.
MIXING HEIGHT.....18000-19000 FT MSL.
TRANSPORT WINDS.....SOUTHWEST 10 TO 15 MPH.

.TONIGHT...
SKY/WEATHER.....CLEAR.
MIN TEMPERATURE.....
VALLEYS.....52-62.
MID SLOPE.....55-65.
24 HR TREND.....2 DEGREES WARMER.
MAX HUMIDITY.....
VALLEYS.....32-42%
MID SLOPE.....27-37%.

Thursday July 15, 2004

24 HR TREND.....2% DRIER
20-FOOT WINDS.....
VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
RIDGE TOP.....SOUTH 10 TO 15 MPH.
HAINES INDEX.....4.
LAL.....1.

.WEDNESDAY...

SKY/WEATHER.....MOSTLY SUNNY.

MAX TEMPERATURE.....

VALLEYS.....91-101.

MID SLOPE.....87-96.

MIN HUMIDITY.....

VALLEYS.....6-11%

MID SLOPE.....9-14%

20-FOOT WINDS.....

VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING WEST 10 TO 15 MPH WITH
ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON.

RIDGE TOP.....SOUTHWEST 10 TO 15 MPH.

HAINES INDEX.....5.

LAL.....1.

.THURSDAY...MOSTLY CLEAR IN THE MORNING THEN PARTLY CLOUDY. LOWS IN
THE 50S TO LOWER 60S. HIGHS IN THE 80S TO UPPER 90S. SOUTHWEST WINDS
10 TO 15 MPH.

.FRIDAY...MOSTLY CLOUDY WITH A CHANCE OF THUNDERSTORMS. LOWS IN THE
50S TO LOWER 60S. HIGHS IN THE 80S TO LOWER 90S. SOUTHWEST WINDS
AROUND 10 MPH.

.SATURDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
80S TO LOWER 90S. WEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
80S TO MID 90S.

.MONDAY...CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE 80S TO
MID 90S.

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CAZ272-132330-

CA ZONE 272 GREATER LAKE TAHOE AREA

REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S
LAKE TAHOE BASIN MANAGEMENT UNIT

730 AM PDT TUE JUL 13 2004

.TODAY...

SKY/WEATHER.....SUNNY.

MAX TEMPERATURE.....

VALLEYS.....80-90.

MID SLOPE.....72-82.

24 HR TREND.....LITTLE CHANGE.

MIN HUMIDITY.....

VALLEYS.....10-18%

MID SLOPE.....17-22%

24 HR TREND.....LITTLE CHANGE.

20-FOOT WINDS.....

VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
IN THE AFTERNOON. LOCAL GUSTS UP TO 30 MPH.

RIDGE TOP.....SOUTHWEST 15 TO 25 MPH.

HAINES INDEX.....4.

LAL.....1.

MIXING HEIGHT.....15500-16500 FT MSL.

TRANSPORT WINDS....SOUTH 15 TO 20 MPH.

.TONIGHT...

SKY/WEATHER.....CLEAR.

MIN TEMPERATURE.....

VALLEYS.....44-54.

24 HR TREND.....2% DRIER
 20-FOOT WINDS.....
 VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
 MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
 RIDGE TOP.....SOUTH 10 TO 15 MPH.
 HAINES INDEX.....4.
 LAL.....1.

.WEDNESDAY...
 SKY/WEATHER.....MOSTLY SUNNY.
 MAX TEMPERATURE.....

VALLEYS.....91-101.
 MID SLOPE.....87-96.

MIN HUMIDITY.....
 VALLEYS.....6-11%
 MID SLOPE.....9-14%

20-FOOT WINDS.....
 VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING WEST 10 TO 15 MPH WITH
 ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON.

RIDGE TOP.....SOUTHWEST 10 TO 15 MPH.
 HAINES INDEX.....5.
 LAL.....1.

.THURSDAY...MOSTLY CLEAR IN THE MORNING THEN PARTLY CLOUDY. LOWS IN
 THE 50S TO LOWER 60S. HIGHS IN THE 80S TO UPPER 90S. SOUTHWEST WINDS
 10 TO 15 MPH.

.FRIDAY...MOSTLY CLOUDY WITH A CHANCE OF THUNDERSTORMS. LOWS IN THE
 50S TO LOWER 60S. HIGHS IN THE 80S TO LOWER 90S. SOUTHWEST WINDS
 AROUND 10 MPH.

.SATURDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
 80S TO LOWER 90S. WEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
 80S TO MID 90S.

.MONDAY...CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE 80S TO
 MID 90S.

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CAZ272-132330-

 CA ZONE 272 GREATER LAKE TAHOE AREA

REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S
 LAKE TAHOE BASIN MANAGEMENT UNIT

 730 AM PDT TUE JUL 13 2004

.TODAY...
 SKY/WEATHER.....SUNNY.
 MAX TEMPERATURE.....
 VALLEYS.....80-90.
 MID SLOPE.....72-82.
 24 HR TREND.....LITTLE CHANGE.

MIN HUMIDITY.....
 VALLEYS.....10-18%
 MID SLOPE.....17-22%
 24 HR TREND.....LITTLE CHANGE.

20-FOOT WINDS.....
 VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
 IN THE AFTERNOON. LOCAL GUSTS UP TO 30 MPH.

RIDGE TOP.....SOUTHWEST 15 TO 25 MPH.
 HAINES INDEX.....4.
 LAL.....1.

MIXING HEIGHT.....15500-16500 FT MSL.
 TRANSPORT WINDS.....SOUTH 15 TO 20 MPH.

.TONIGHT...
 SKY/WEATHER.....CLEAR.
 MIN TEMPERATURE.....
 VALLEYS.....44-54.

MID SLOPE 48-58.

24 HR TREND LITTLE CHANGE.

MAX HUMIDITY VALLEYS .64-74% MID SLOPE .53-63%.

24 HR TREND... LITTLE CHANGE.

20-FOOT WINDS VALLEYS/SLOPE. ...SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 25 MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.

RIDGE TOP SOUTH 15 TO 25 MPH. HAINES INDEX .4.

LAL .1. .WEDNESDAY...

SKY/WEATHER ...SUNNY.

MAX TEMPERATURE VALLEYS. 80-90. MID SLOPE 75-85. MIN HUMIDITY VALLEYS 9-17% MID SLOPE 16-21%

20-FOOT WINDS. .'. '"

VALLEYS/SLOPE... UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH IN THE AFTERNOON. ISOLATED GUSTS UP TO 30 MPH. RIDGE TOP SOUTHWEST AROUND 15 MPH. HAINES INDEX S.

LAL .1.

.THURSDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50s. HIGHS IN THE 70S TO MID 80S. SOUTHWEST WINDS 10 TO 15 MPH.

.FRIDAY...MOSTLY CLOUDY WITH A CHANCE OF THUNDERSTORMS. LOWS IN THE 40S TO UPPER 50S. HIGHS IN THE 70S TO LOWER 80s. SOUTHWEST WINDS

AROUND 10 MPH.

.SATURDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S TO LOWER 80S. SOUTHWEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S TO LOWER 80S.

.MONDAY...CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70s TO MID 80S.

Jui 15, 04 13:35 text 1: -3:FWFREX (selection) Page 1/4

FNUS55 I<REV 132203
FWFREX

FIRE WEATHER PLANWING FORECAST FOR NORTHEAST CA AND WESTERN NV NATIONAL WEATHER
SERVICE RENO NV
229 PM PDT TOE JUL 13 2004

+++++T+++++

...ISOLATED DRY THUNDERSTORMS POSSIBLE ON THURSDAY BEFORE
TRANSITIONING INTO WETTING THUNDERSTORMS THURSDAY NIGHT AND FRIDAY...

++++~++++T++++T++++T

.DISCUSSION..

DRY AND WARM CONDITIONS WILL CONTINUE THROUGH WEDNESDAY NIGHT AS AN UPPER LEVEL HIGH
PRESSURE RIDGE REMAINS OVER THE SOUTHWEST US.
MONSOONAL MOISTURE IS EXPECTED TO REACH ZONES 459 AND 273 BY THURSDAY AFTERNOON WITH
ISOLATED DRY THUNDERSTORMS POSSIBLE. BY THURSDAY NIGHT AND FRIDAY... INCREASED TROPICAL
MOISTURE WITHIN THE MONSOONAL FLOW MAY PRODUCE WETTING RAIN OVER SOME AREAS. BY THIS
WEEKEND...DRY
CONDITIONS ARE EXPECTED TO RETURN WITH LOCALLY BREEZY CONDITIONS POSSIBLE IN THE
AFTERNOONS AND EVENINGS.

NOTE: THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS

NOTE: PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
WWW.WRH.NOAA.GOV/RENO/FIRE

NVZ450-453-141S00-

+++++T+++++T++++TT+++++T+++++T NV ZONE 450
WESTERN NEVADA INCLUDING CARSON CI-Y / DOUGLAS AND
STOREY COUNTIES, SOUTHERN WASHOE COUNTY AND LYON. COUNTY

REGION INCLUDES: A PORTION OF THE HUMBOLDT TOIYABE NF

NV ZONE 453 WEST CENTRAL NEVADA BASIN AND RANGE INCLUDING PERSHING AND CHURCHILL
COUNTIES, EAST-CENTRAL WASHOE COUNTY, AND NORTHERN LYON COUNTY

+++++T+++++T+++++T+++++T+++++T
229 PM PDT TUE JUL 13 2004

.TONIGHT..

SKY/WEATHER MOSTLY CLEAR.

MIN TEMPERATURE VALLEYS 52-62. ! MID SLOPE 55-65.

24 HR TREND LITTLE CHANGE.

MAX HUMIDITY VALLEYS. 34-44% MID SLOPE 28-38%.

24 HR TREND LITTLE CHANGE.

20-FOOT WINDS VALLEYS/SLOPE...NORTHWEST WINDS AROUND 10 MPH WITH rSOLATED
GUSTS TO 30 MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
RIDGE TOP SOUTH 15 TO 20 MPH. HAINES INPEX 5. LAL. 1.

.WEDNESDAY..

SKY/WEATHER MOSTLY SUNNY.

MAX TEMPERATURE VALLEYS. 91-101. MID SLOPE. 87-97.

24 HR TREND LITTLE CHANGE.

MIN HUMIDITY VALLEYS 7-12%

MID SLOPE .10-15%

hursday July 15, 2004 1/4

Ju115,04 13:35 Text 1: -3:FWFREX (selection) Page 2/4

24 HR TREND.. LITTLE CHANGE. 20-FOOT WINDS; .

VALLEYS/SLOPE... .UPSLOPE 4-8 MPH BECOMING WEST AROUND 10 MPH IN
 THE AFTERNOON. ISOLATED GUSTS UP TO 30 MPH. RIDGE TOP
 ..SOUTHWEST 10 TO 15 MPH. HAINES INDEX ...5.
 LAL .1.
 MIXING HEIGHT .18500-19500 FT MSL.
 TRANSP~T WINDS .SOUTHWEST 10 TO 15 MPH.

 .WEDNESDAY NIGHT...
 SKY/WEATHER ..MOSTLY CLEAR. MIN TEMPERATURE VALLEYS 54-64.
 MID SLOPE .57-67. MAX HUMIDITY VALLEYS .35-45%
 MID SLOPE .32-42%.
 20-FOOT WINDS. ...
 VALLEYS/ SLOPE. ...WEST WINDS AROUND 10 MPH WITH ISOLATED GUSTS TO 30 MPH IN THE EVENING BECOMING
 DOWNSLOPE
 2-6 MPH.
 RIDGE TOP. SOUTH 10 TO 15 MPH. HAINES INDEX.. 5.
 LAL .1.

 .THURSDAY. -
 SKY/WEATHER .MOSTLY SUNNY THEN BECOMING PARTLY CLOUDY. SLIGHT
 CHANCE OF THUNDERSTORMS IN THE AFTERNOON.
 MAX TEMPERATURE VALLEYS 89-99.
 MID SLOPE 85-94. MIN HUMIDITY VALLEYS. 9-14%
 MID SLOPE .12-19%

 20-FOOT WINDS VALLEYS/SLOPE UPSLOPE 4-8 MPH BECOMING WEST AROUND
 10 MPH WITH ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON. RIDGE TOP
 SOUTHWEST 15 TO 20 MPH. HAINES INDEX ..4.
 LAL .2.
 CHC WETTING RAIN. ...10%

 .FRIDAY. ..PARTLY CLOUDY. CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS
 IN THE 50S TO MID 60S. HIGHS IN THE 70S TO UPPER 80S. LIGHT
 SLOPE
 WINDS.
 .SATURDAY. ..PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND
 THUNDERSTORMS. LOWS IN THE 50s TO LOWER 60S. HIGHS IN THE 80S TO
 LOWER 90S. LIGHT SLOPE WINDS.
 .SUNDAY.. .MOSTLY CLEAR. SLIGHT CHANCE OF THUNDERSTORMS. LOWS IN
 THE
 50S TO LOWER 60S. HIGHS IN THE 80S TO LOWER 90S -WEST WINDS AROUND
 10 MPH.
 .MONDAY... .MOSTLY CLEAR. LOWS IN THE 40S TO UPPER 50S. HIGHS IN
 THE 80S TO MID 90S.
 .TUESDAY.. .CLEAR. LOWS IN THE 40S TO UPPER 50S. HIGHS IN THE
 80S TO MID 90S.

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 CAZ272-141500-
 ++++++
 CA ZONE 272 GREATER LAKE TAHOE AREA

 REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S LAKE TAHOE BASIN MANAGEMENT UNIT
 ++++++~+++++
 +++++~ 229 PM PDT TUE JUL 13 2004

 .TONIGHT...
 SKY/WEATHER .CLEAR.
 2/4 Thursday July 15, 2004

Jul 15, 04 13:35

Text 1: -3:FWFREVE (selection)

Page 3/4

MIN TEMPERATURE.....
VALLEYS.....40-50.
MID SLOPE.....43-53.
24 HR TREND.....LITTLE CHANGE.
MAX HUMIDITY.....
VALLEYS.....73-83%
MID SLOPE.....69-79%
24 HR TREND.....7% WETTER.
20-FOOT WINDS.....
VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH ISOLATED GUSTS
TO 30 MPH IN THE EVENING BECOMING DOWNSLOPE
2-6 MPH.
RIDGE TOP.....SOUTH 20 TO 25 MPH.
HAINES INDEX.....4.
LAL.....1.

.WEDNESDAY...
SKY/WEATHER.....SUNNY.
MAX TEMPERATURE.....
VALLEYS.....82-92.
MID SLOPE.....75-85.
24 HR TREND.....LITTLE CHANGE.
MIN HUMIDITY.....
VALLEYS.....6-11%
MID SLOPE.....12-17%
24 HR TREND.....3% DRIER.
20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST AROUND 10 MPH
IN THE AFTERNOON. ISOLATED GUSTS UP TO 30 MPH.
RIDGE TOP.....SOUTHWEST AROUND 15 MPH.
HAINES INDEX.....5.
LAL.....1.
MIXING HEIGHT.....16000-17000 FT MSL.
TRANSPORT WINDS.....SOUTH 10 TO 15 MPH.

.WEDNESDAY NIGHT...
SKY/WEATHER.....MOSTLY CLEAR.
MIN TEMPERATURE.....
VALLEYS.....49-59.
MID SLOPE.....53-63.
MAX HUMIDITY.....
VALLEYS.....74-84%
MID SLOPE.....69-79%
20-FOOT WINDS.....
VALLEYS/SLOPE....DOWNSLOPE 2-6 MPH.
RIDGE TOP.....SOUTH AROUND 15 MPH.
HAINES INDEX.....5.
LAL.....1.

.THURSDAY...
SKY/WEATHER.....MOSTLY SUNNY.
MAX TEMPERATURE.....
VALLEYS.....79-89.
MID SLOPE.....74-84.
MIN HUMIDITY.....
VALLEYS.....8-13%
MID SLOPE.....14-19%
20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST AROUND 10 MPH
WITH ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON.
RIDGE TOP.....SOUTHWEST AROUND 15 MPH.
HAINES INDEX.....4.
LAL.....1.

.FRIDAY...PARTLY CLOUDY. CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS
IN THE 50S TO LOWER 60S. HIGHS IN THE 60S TO UPPER 70S. LIGHT SLOPE
WINDS.
.SATURDAY...PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND
THUNDERSTORMS. LOWS IN THE 40S TO UPPER 50S. HIGHS IN THE 70S TO
LOWER 80S. LIGHT SLOPE WINDS.

Thursday July 15, 2004

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S

TO LOWER 80S. SOUTHWEST WINDS AROUND 10 MPH.

.MONDAY...MOSTLY CLEAR. LOWS IN THE 40S TO LOWER 50S. HIGHS IN THE 70S TO MID 80S.

.TUESDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S TO MID 80S.

Jul 15, 04 13:34

Text 1: -2:FWFREY (selection)

Page 2/3

20-FOOT WINDS.....
VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30 MPH
IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
RIDGE TOP.....SOUTH 10 TO 15 MPH.
HAINES INDEX.....5.
LAL.....1.

.THURSDAY...
SKY/WEATHER.....PARTLY CLOUDY.
MAX TEMPERATURE.....

VALLEYS.....89-99.
MID SLOPE.....86-96.
MIN HUMIDITY.....
VALLEYS.....9-14%
MID SLOPE.....10-15%

20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING WEST 10 TO 15 MPH WITH
GUSTS 25 TO 30 MPH IN THE AFTERNOON.
RIDGE TOP.....SOUTHWEST 15 TO 20 MPH.
HAINES INDEX.....5.
LAL.....1.

.FRIDAY...PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND THUNDERSTORMS.
LOWS IN THE LOWER 50S TO MID 60S. HIGHS IN THE MID 80S TO MID 90S.
AFTERNOON WEST WINDS 10 TO 15 MPH.

.SATURDAY...PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND
THUNDERSTORMS ZONE 453. LOWS IN THE MID 50S TO MID 60S. HIGHS IN THE
MID 80S TO MID 90S. AFTERNOON WEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE LOWER 50S TO LOWER 60S. HIGHS
IN THE LOWER 80S TO LOWER 90S. AFTERNOON WEST WINDS 10 TO 20 MPH.

.MONDAY...CLEAR. LOWS IN THE UPPER 40S TO UPPER 50S. HIGHS IN THE
MID 80S TO MID 90S.

.TUESDAY...CLEAR. LOWS IN THE UPPER 40S TO UPPER 50S. HIGHS IN THE
UPPER 80S TO UPPER 90S.

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CAZ272-151500-

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CA ZONE 272 GREATER LAKE TAHOE AREA

REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S
LAKE TAHOE BASIN MANAGEMENT UNIT

+++++
730 AM PDT WED JUL 14 2004

.TODAY...
SKY/WEATHER.....MOSTLY SUNNY.
MAX TEMPERATURE.....
VALLEYS.....78-88.
MID SLOPE.....75-85.
24 HR TREND.....LITTLE CHANGE.

MIN HUMIDITY.....
VALLEYS.....13-18%
MID SLOPE.....14-19%
24 HR TREND.....3% WETTER.

20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
WITH GUSTS 25 TO 30 MPH IN THE AFTERNOON.

RIDGE TOP.....SOUTHWEST AROUND 15 MPH.
HAINES INDEX.....5.
LAL.....1.

MIXING HEIGHT.....18000-18500 FT MSL.
TRANSPORT WINDS.....SOUTH 10 TO 15 MPH.

.TONIGHT...
SKY/WEATHER.....MOSTLY CLEAR.
MIN TEMPERATURE.....
VALLEYS.....44-54.
MID SLOPE.....53-63.

24 HR TREND... 3 DEGREES WARMER. MAX HUMIDITY VALLEYS 70-80%

MID SLOPE.. 35-45%

24 HR TREND 4% WETTER.

20-FOOT WINDS VALLEYS/SLOPE.. SOUTHWEST 10 TO 15 MPH WITH
GUSTS TO 25 MPH BECOMING DOWNSLOPE 2-6 MPH. RIDGE TOP SOUTHWEST
AROUND 15 MPH. HAINES INDEX .5. LAL. 1.

.THURSDAY...

SKY/WEATHER... MOSTLY SUNNY THEN BECOMING PARTLY CLOUDY.

MAX TEMPERATURE VALLEYS 78-88.

MID SLOPE 75-85. MIN HUMIDITY VALLEYS .13-18%

MID SLOPE .14-19%

20-FOOT WINDS VALLEYS/SLOPE UPSLOPE 4-8 MPH BECOMING SOUTHWEST
10 TO 15 MPH

WITH GUSTS 25 TO 30 MPH IN THE AFTERNOON.

RIDGE TOP SOUTHWEST AROUND 15 MPH. HAINES INDEX 5.

LAL .1.

.FRIDAY.. PARTLY CLOUDY. CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS
IN THE LOWER 40S TO LOWER 50S. HIGHS IN THE MID 70S TO MID 80S.
AFTERNOON SOUTHWEST WINDS 10 TO 15 MPH.

.SATURDAY.. PARTLY CLOUDY. LOWS IN THE LOWER 40S TO LOWER 50S.
HIGHS
IN THE LOWER 70S TO LOWER 80S. AFTERNOON SOUTHWEST WINDS 10 TO 20
MPH.

.SUNDAY.. MOSTLY CLEAR. LOWS IN THE LOWER 40S TO LOWER 50S.
HIGHS IN THE 70S TO LOWER 80S. AFTERNOON SOUTHWEST WINDS 10 TO
15 MPH.

.MONDAY.. CLEAR. LOWS IN THE MID 40S TO MID 50S. HIGHS IN THE
MID 70S TO MID 80S.

.TUESDAY.. MOSTLY CLEAR. LOWS IN THE LOWER 40S TO LOWER 50S.
HIGHS IN THE 70S TO MID 80S.

Spot Forecast for WATERFALL Spot Forecast for WATERFALL Fire

National Weather Service Reno

730 AM PDT Wed Jul 14 2004

IF CONDITIONS BECOME UNREPRESENTATIVE,

CONTACT THE NATIONAL WEATHER SERVICE.

DISCUSSION... DRY AND WARM CONDITIONS WILL CONTINUE AS HIGH PRESSURE
REMAINS OVER THE DESERT SOUTH WEST. MONSOONAL MOISTURE WILL REACH
FIRE AREA BY THURSDAY NIGHT AND MAY PRODUCE WETTING RAINS OVER SOME
AREAS.

FOR TODAY

WEATHER..... PARTLY CLOUDY

TEMPERATURE..... MAX 75 TO 80

HUMIDITY..... MIN 12 TO 16%

WIND... 20 FOOT..... SOUTHWEST 10 TO 15 MPH WITH GUSTS UP TO 25 MPH.

FOR TONIGHT

WEATHER..... MOSTLY CLEAR

TEMPERATURE..... MIN 40 TO 45

HUMIDITY..... MAX 45 TO 50%

WIND... 20 FOOT..... SOUTHWEST 5 TO 10 MPH BECOMING

DOWNSLOPE/DOWNVALLEY 4 TO 8 PH AFTER SUNSET.

OUTLOOK FOR TOMORROW

WEATHER.....PARTLY CLOUDY
TEMPERATURE.....MAX 75 TO 80
HUMIDITY.....MIN 14 TO 18%
WIND...20 FOOT.....SOUTHWEST 10 TO 15 MPH WITH GUSTS UP TO 25 MPH.

FORECASTER...SMITH/SETTJE

Spot Forecast for WATERFALL 1 Spot Forecast for WATERFALL 1 Fire
National Weather Service Reno
213 PM PDT Wed Jul 14 2004

IF CONDITIONS BECOME UNREPRESENTATIVE,
CONTACT THE NATIONAL WEATHER SERVICE.
DISCUSSION...DRY AND WARM CONDITIONS WILL CONTINUE AS HIGH PRESSURE
REMAINS OVER THE DESERT SOUTH WEST. MID AND HIGH LEVEL MOISTURE WILL
BEGIN TO SPREAD ACROSS THE AREA THURSDAY AND THURSDAY NIGHT. FRIDAY
EXPECT COOLER CONDITIONS WITH HIGHER RELATIVE HUMIDITIES. THE CHANCE
OF WETTING RAINS OVER THE AREA FRIDAY ARE MINIMAL. EXPECT AFTERNOON
WINDS FROM THE WEST SOUTHWEST AT 15 TO 25 MPH.

FOR TODAY

WEATHER.....MOSTLY SUNNY.
TEMPERATURE.....MAX 84 TO 86
HUMIDITY.....MIN 8 TO 12%
WIND...20 FOOT.....WEST SOUTHWEST 12 TO 16 MPH. GUSTS 30 TO 35 MPH
TIL 6PM.

FOR TONIGHT

WEATHER.....MOSTLY CLEAR.
TEMPERATURE.....MIN 55 TO 58
HUMIDITY.....MAX 30 TO 34%
WIND...20 FOOT.....6PM TO 9PM SOUTHWEST WIND 8 TO 12 MPH WITH
GUSTS 24 TO 28 MPH. AFTER 9PM BECOMING SLOPE
WINDS 2 TO 4 MPH.

OUTLOOK FOR TOMORROW

WEATHER.....PARTLY CLOUDY
TEMPERATURE.....MAX 82 TO 85
HUMIDITY.....MIN 9 TO 13%
WIND...20 FOOT.....LIGHT SLOPE WINDS. AFTERNOON WINDS
SOUTHWEST 10 TO 15 MPH WITH GUSTS UP TO 30 MPH.

FORECASTER...JAH

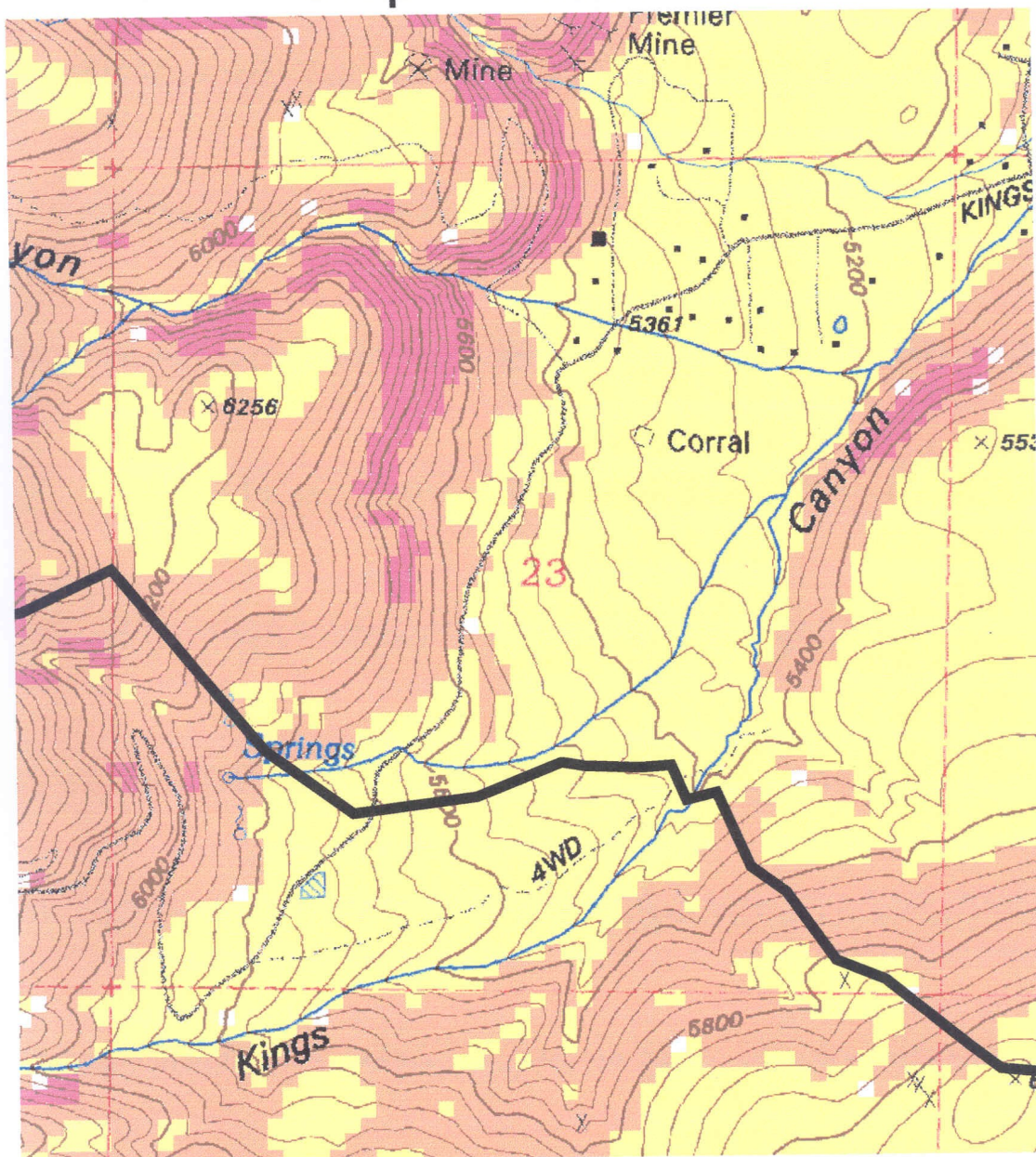
Orthophoto-quadrangle of Staging Area 2. Photo taken before the fire.

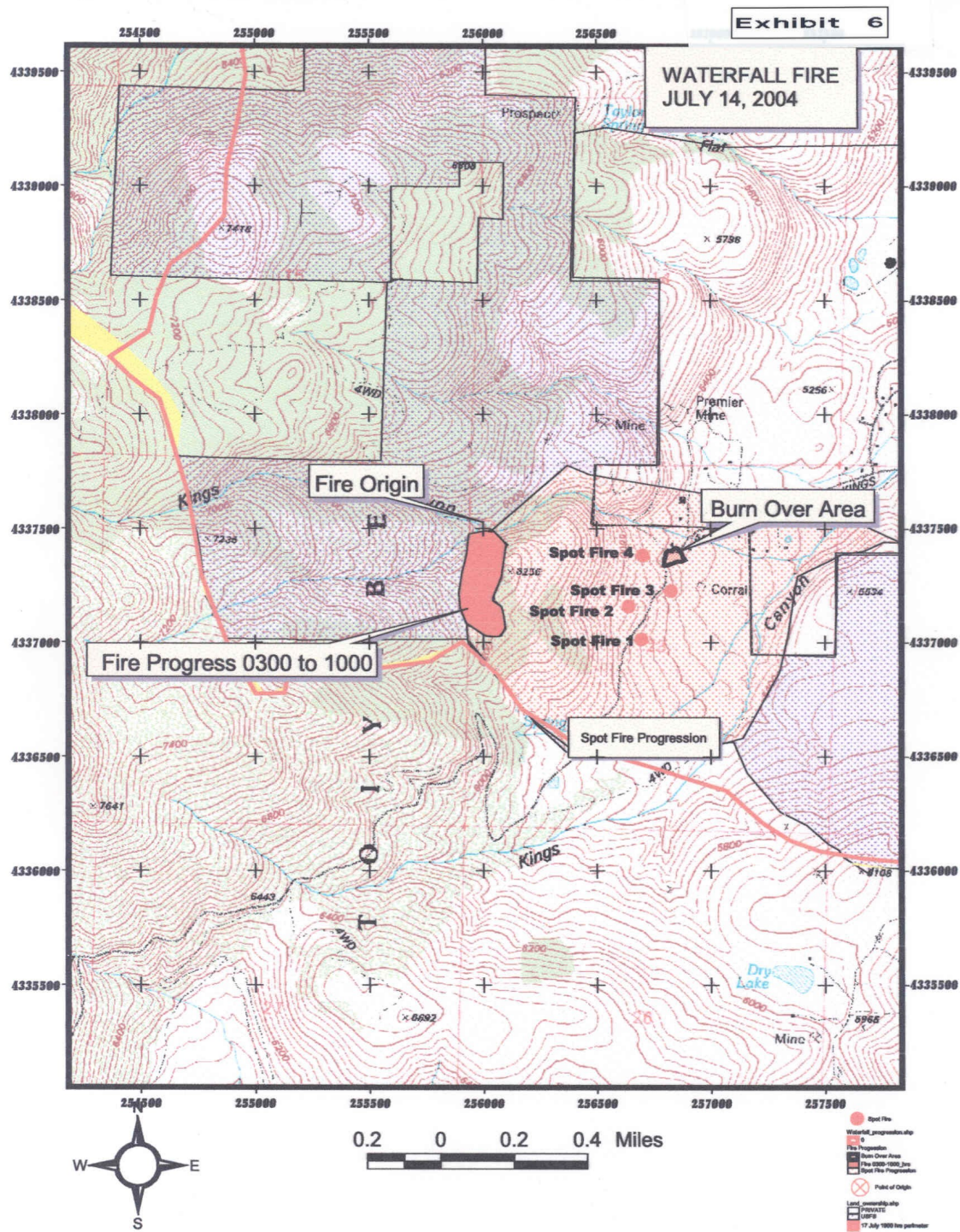


ICARSON\FIRE\WATERFALL\WATERFALL SEC23 8X11.MXD 2004JUL21

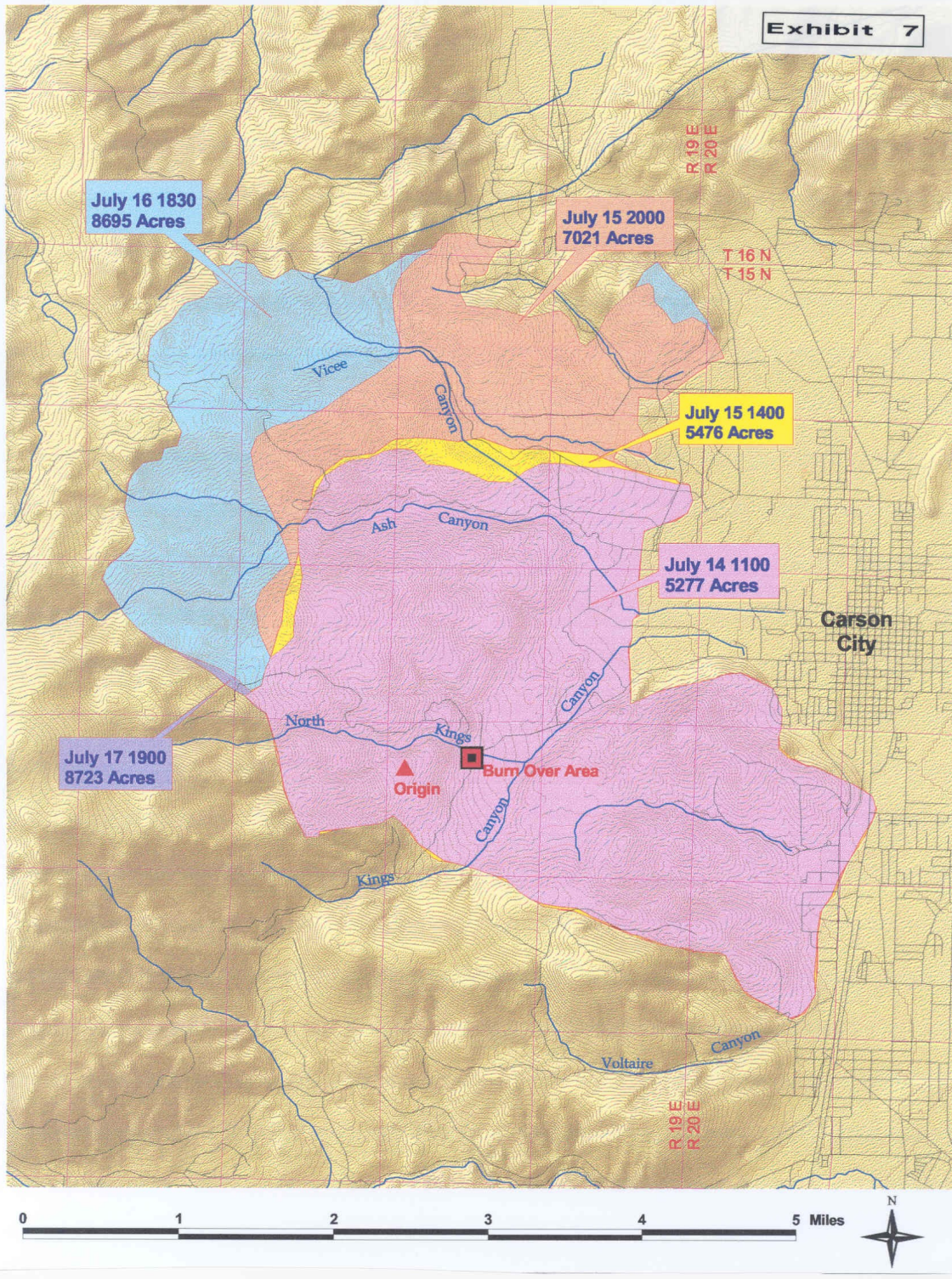
Slope Classes

Exhibit 3





Waterfall Incident Fire Progression July 14 - 17, 2004



Appendix D

WATERFALL FIRE INCIDENT WITH POTENTIAL DESTROYED EQUIPMENT

Carson City Fire Department Heavy Rescue Truck

Exhibit 1



Carson City Fire Department Heavy Rescue Truck

Exhibit 2



Exhibit 3



Central Lyon County Fire Department Brush Engine

Exhibit 4



Central Lyon County Fire Department Brush Engine

Exhibit 5



Exhibit 6



Humboldt-Toiyabe NF 6-passenger vehicle

Exhibit 7



Humboldt-Toiyabe NF 6-passenger vehicle

Exhibit 8



Exhibit 9



Appendix E

